R E P O R T

MCL Companies
455 East Illinois Street
Suite 565
Chicago, Illinois 60611

Work Order for Soil Management
Open Excavation

E.1
3/4/99

River East Development
Lindsay Light II Site
Chicago, Illinois

STS Project No. 24418-RR

March 4, 1999

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FIGURES

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MCL COMPANIES
River East Development
Lindsay Light II Site
Chicago, Illinois

SITE EXCAVATION SOIL MANAGEMENT PLAN WORK ORDER

Property Owner: River East L.L.C.

Property Location: Parcel Bounded by Illinois Street (south), McClurg Court (east), Columbus Drive (west), and Grand Avenue (north).

Parcel ID Number:______________

1.0 INTRODUCTION

The subject property for this Work Order is the Lindsay Light II Site bounded by Illinois Street on the south, Grand Avenue on the north, McClurg Court on the east and Columbus Drive on the west. The development which is proposed for the Lindsay Light II Site, consists of a mixed-use commercial development over the entire site. Development includes two towers, one each at the east and west ends of the site, a five-story connecting complex between the towers and a four-story basement. This development will require an approximately 55 ft. deep excavation of the entire Lindsay Light parcel, and it is this excavation which will require the management and disposal of the residual thorium-contaminated soil remaining at the site.

The site is owned by River East L.L.C., who are responsible for implementing this Work Order. River East L.L.C. is contracting with Morse-Diesel as Construction Manager and STS Consultants, Ltd. as Environmental Consultant to complete a commercial development on this property. Kerr-McGee L.L.C., along with River East L.L.C., remain PRPs on the Lindsay Light II Site. Kerr-McGee L.L.C., however, has no role in the pending removal action beyond transport and disposal arrangements. Kerr-McGee will be responsible for transport and disposal of any thorium-impacted soils removed from the site. River East L.L.C., Morse-Diesel, and STS will be responsible for implementation of all other provisions of this Work Order.

In accordance with discussions with EPA on-scene coordinator Mr. Fred Micke, the work to be done will be in general accordance with the scoping and planning documents (S&P) for the Lindsay Light II work which were prepared by Kerr-McGee L.L.C. The implementation for the current work scope will be the responsibility of River East L.L.C. through their contractors Morse-Diesel and STS.

This Work Order describes the site development and excavation work which is proposed at the Lindsay Light II Site as part of the River East development. In particular, the work described herein is that which will be required in the removal and management of the thorium-contaminated soil as part of the site development work. Edie Hampson, of STS Consultants, Ltd., will serve as the Authorized Project Coordinator and will be charged with enforcing the procedures contained within this Work Order. Radiation Safety Services, Inc. (RSSI) is the proposed health physics subcontractor (Attachment 5). Communications with regard to this Work Order or other aspects of this project should be directed through Edie Hampson. Attachment 1 presents an organization chart identifying the chain of communication between River East, Morse-Diesel and STS representatives and their subcontractors.

Site remediation work previously completed at the site included the removal of 24,025 tons of contaminated soil and disposal at Envirocare of Utah. An area of residual contamination remained following that removal as a result of groundwater limiting the depth to which excavation could proceed. Assuming approval of this Work Order and the anticipated progress of the site development schedule, the remaining contamination is anticipated to be removed in 150 days (5 months) from start of construction, which is currently scheduled for late March 1999.

Except as proposed herein, and as referenced in this Work Order, the work is to be performed in general accordance with the Scoping and Planning (S&P) Documents for the Lindsay Light II site. In planning for this project, Mr. Fred Micke advised that the S&P Documents did not need to be rewritten. These previously prepared S&P Documents describe the sampling methods, air monitoring procedures, equipment to be used, transport boxes (20-ton roll-off containers) used to ship the contaminated soil, and, except where the Work Order differs from those documents, the S&P documents will govern how the work is to be conducted. Specific differences include the party responsible for implementing this work which is River East L.L.C. through their contractors, Construction Manager, Morse-Diesel and Environmental Consultant, STS. Communications and reporting obligations will run through the Project Coordinator at STS, who will be responsible for monthly progress reports under the UAO. Excavation methods are revised herein. Additionally, in that excavation will proceed to a total of approximately 55 ft. below grade as part of the development, backfill specifications in the S&P Documents and at V.3.h. of the Unilateral Administrative Order (UAO) will not apply except on smaller scale excavations which may require backfill to facilitate site traffic.

For the purpose of clarity, the following responsibilities are different from the S&P documents:

Owner:	River East L.L.C.
Construction Manager:	Morse-Diesel
Environmental Consultant:	STS Consultants, Ltd.
Health Physics Subcontractor:	RSSI

Kerr-McGee Chemical L.L.C. will provide for transport and disposal of the thorium-contaminated soil, as in the S&P documents.

Section 2.0 of this Work Order describes the proposed project development for the site. The proposed development is illustrated in Figure 1. This section also describes the anticipated construction sequence and describes where removal and management of thorium-contaminated soil will be required.

Section 3.0 of this Work Order describes the thorium-contaminated soil locations known to be present on or adjacent to the site. These locations are shown on Figure 2.

Section 4.0 of this Work Order describes the excavation sequence and the soil management practices for handling the uncontaminated and contaminated soils. This section describes the excavation equipment which will be used and provides for the staging of the soil and transport boxes as excavation proceeds throughout the site.

Section 5.0 describes the sampling methods which are proposed for the various excavation methods which will be utilized in the site construction.

2.0 PROJECT DESCRIPTION

2.1 Generalized Construction Description

The proposed River East development will occupy the entire property parcel bounded by Illinois Street (south), McClurg Court (east), Columbus Drive, (west), and Grand Avenue (north). Two high-rise towers are planned, at the east and west ends of the site. The interval between the two towers will be developed as commercial space at a height of 5 stories. The development will include four basement levels. It is this basement space which requires the removal of the remaining thorium-impacted soil, as the basement will extend to a depth of approximately 55 feet below the current site grade.

The proposed method of development is referred to as "top down", which is in reference to the practice of extending the superstructure up at the same time the basement and substructure are being excavated and constructed. Since both the substructure and superstructure are in progress at the same time, the building can be completed in a shortened schedule.

The top down construction method will include the following construction/excavation activities which have the potential to encounter thorium-contaminated soil:

- General site-wide excavation
- Caisson excavation/installation
- Guide wall construction/slurry wall excavation/installation
- Tower core excavation

The construction excavation activities are expected to be conducted between the hours of 8:00 AM - 8:00 PM. The first activity, initial site-wide excavation, is expected to commence in late March 1999.

2.1.1 General Site-Wide Excavation

This activity will proceed in several stages. One stage is the lowering of the site by approximately five feet. This initial stage will precede the slurry wall guide wall construction, slurry wall excavation, and caisson installation. The second site-wide excavation stage will follow the installation of the caissons and slurry wall. This second stage of excavation will lower the site to an approximate elevation of 15 feet below the current site grade, or an additional 10 feet, which is the depth of the first basement level. At that point, in the absence of any additional thorium contamination, the first basement floor would be constructed. If thorium-contaminated soil is evident below this depth, the contaminated soil may be excavated and removed and the resulting excavations backfilled before the first basement floor is constructed.

2.1.2 Caisson Excavation Installation

The caissons are large diameter belled shafts which will extend to minimum depths of 96 ft. They will be drilled after the site has been lowered 5 ft in the initial site-wide excavation The caisson spacing varies depending on the location beneath the structure. Around the perimeter wall, spacing is on the order of 30 ft., with the slurry wall spanning the interval between caissons. Under the building towers, spacing is as close as approximately 25 ft. Spacing between rows of caissons is as wide as 55 ft. A plan showing the caisson distribution is included as Figure 3.

A total of 137 caissons are to be drilled for this project. At each caisson location, a probe test pit will be excavated from the minus five foot grade to natural soils, so as to explore for and remove any obstructions which might interfere with the caisson shaft drilling. It is proposed to screen the excavated spoil from these test pits for elevated gamma readings as they are dug. If contamination is detected, it will be removed. If no contamination is found, or after removal of any identified contamination, the excavation will be backfilled to the minus five foot grade to facilitate construction activities and traffic.

The caisson shafts are excavated using large diameter augers. Caisson shaft diameters are designed to range from 3.5 to 9.5 feet.

Design drawings showing caisson locations, (Figure 3) indicate that 22 caissons are within the Lake Lindsay area. Approximately half of these are in areas previously documented as clean, based on borings. Where the caissons are advanced through the previously excavated volumes, there is no risk of encountering thorium contamination. Additionally, below a depth of 22 ft., no thorium contamination was detected in the borings. The clay which lies below the deepest identified thorium impacted soil is not expected to exhibit any elevated thorium measurements.

2.1.3 Guide Wall Construction/Slurry Wall Excavation Installation

The slurry wall surrounding the site will be a structural wall providing lateral restraint for the excavation as the basement is excavated, and a low permeability wall providing a cutoff for the groundwater. The wall will be excavated in panels between perimeter caissons. The slurry wall construction requires the installation of guide walls. The guide walls are two parallel concrete panels at the ground surface, extending 3 to 5 feet deep which constrain the excavating equipment to the proper alignment during excavation of the slurry wall. Excavation of the slurry wall will be conducted using a clam excavator on a crane.

The excavation proceeds under a bentonite slurry as the wall is excavated to the design width of 30 inches and a design depth of 62 feet below current grade. Along the southern section of the site, in the area known as "Lake Lindsay", there is a potential for the slurry wall excavation to encounter thorium-contaminated soil at an anticipated depth of 14 to 15 feet. The location of the slurry wall is shown on Figure 3.

2.1.4 Tower Core Excavation

The fourth excavation activity involves the tower core excavation for the high rise tower at the east end of the site. The core will be excavated within a coffer dam structure to a depth 65 feet below grade, followed by construction of the shear wall. The core excavation may require a specific dewatering effort before the dewatering for the remainder of the site. A discussion of dewatering is included in Section 4.7. The excavation for the tower core will proceed concurrently with the caisson drilling and slurry wall excavation.

2.2 Contamination Screening

The following contamination screening methods are proposed to establish the point in the project excavation at which it can be demonstrated that the UAO obligation for removal of contamination has been satisfied to the EPA. The site will be surveyed in two modes. First, the soil which is excavated from immediately beneath the asphalt to minus five feet will be surveyed according to the grid spacing described below (Section 2.2.1). This grid surveying will be at intervals not to exceed two feet in depth through this five foot excavation per Section 2.3. Any contaminated areas will be excavated, the contamination managed according to this Work Order and S&P documents, the excavation surveyed to determine clean closure, and as verified as clean.

At the minus five foot depth, construction activities will include the installation of 137 caissons site-wide. At each caisson location, a probe test pit will be excavated to explore for and remove obstructions which might interfere with the drilling of the caisson. The excavations will penetrate through the urban fill to the natural soils. Excavated soil will be screened by health physics technicians in the backhoe bucket and in the excavated soil pile for elevated gamma using a 2 x 2 NaI gamma detector.

If no elevated gamma readings are evident in the survey of the minus five foot surface and no contamination is evident in the caisson test pits, with the exception of Lake Lindsay, it is proposed that construction excavation will proceed with the removal of the Lake Lindsay contamination. The sampling and verification will be in accordance with the S&P documents and Section 5.0 of this Work Order.

Upon removal of the Lake Lindsay contamination, it would be requested that the site be determined by EPA to be clean and the CERCLA monitoring responsibilities be found to be satisfied. At that point, the Final Closure Report would be prepared and the remainder of the site excavated using normal construction methods without monitoring under the UAO.

2.2.1 Contamination Survey Grid Spacing

Based on previous remediation activities on the site, the upper surface materials can be divided into two general areas: clean fill placed after recent removal efforts, and pavement areas which were previously surveyed with no elevated gamma readings, and which were not excavated. Following the recent removal activities, the entire site was repaved, including the new clean fill and the existing, apparently uncontaminated, pavement areas.

The asphalt pavement will be removed from portions of the site, beginning with the eastern one third of the site. Upon removal, the apparently uncontaminated asphalt pavement debris will be screened as specified in Section 4.2. The asphalt that covers the new clean fill does not require screening. Screening of the asphalt and underlying soil on the remainder of the site will be conducted as the asphalt is removed in the same manner as in Section 4.2.

The exposed soil surface will be surveyed for elevated gamma readings. Those areas underlain by clean, imported gravel fill will not be surveyed for gamma radiation. The survey will proceed to cover the exposed soil on survey lines spaced no wider than 5 meters. Gamma count values shall be taken at intervals spaced no greater than 5 meters (5 x 5 meter grid). The areas between the grid points will be scanned following S&P SOP 210-1 so as to cover the intra-grid areas.

Locations with elevated gamma counts will be marked and the vicinity surveyed at a 1 meter grid spacing to identify the limits of the elevated readings. Those areas will be designated as a contaminated zones and soil removed. Verification sampling and analyses will be conducted as specified in this Work Order.

The spacing on the grid lines per this Work Order is closer than the 6 x 6 meter survey grid used on the original site screening survey as part of the Site Characterization Investigation, dated October 27, 1995. Additionally, that original screening was conducted through the asphalt pavement. The survey, as proposed herein, is at a tighter spacing, includes the same grid and intra-grid scanning as previously approved, and will be conducted after removal of the pavement cover.

The grid will be laid out utilizing the construction site column lines as a point of reference. These column locations will be readily identifiable throughout the construction sequence and will be correlated on map overlays with the site metric grid previously used.

2.3 Contamination Screening - Depth Intervals

The site was previously surveyed from the surface and through a boring program for evidence of contamination. A removal effort was conducted based on those surveys. Boring exploration documented an area of residual contamination in the area referred to as Lake Lindsay (site metric coordinates 35E to 70E, minus 5N to 30N).

For the purposes of screening soil to be excavated, the site soils shall be subdivided as follows.

2.3.1 Clean soil

Material imported to the site (gravel and stone) which was used to backfill the excavation from the previous removal effort is assumed to be clean and will not require screening prior to removal. The natural sand and clay soils beneath the site are assumed to be clean except at Lake Lindsay where contamination in the urban fill soils extended into the sand. If no contamination is noted in the fill soil at minus five feet or in the caisson test pits, all soil below five feet deep will be assumed clean, with the exception of Lake Lindsay sand.

2.3.2 Potentially Contaminated Soil

The near surface urban fill and rubble debris is considered potentially contaminated as a result of potential incorporation of material from the former Lindsay Light building. Screening of the soil prior to excavation will follow the grid spacing discussed in Section 2.2, Grid Spacing. This screening will be done at vertical intervals of 2 feet (24 inch maximum). Screening will be performed to a depth of minus five feet below the current street grade. This two foot excavation interval considers the depth of investigation and its affect on sensitivity of the survey instruments, the likely presence of contaminated materials throughout the excavated interval, the type and energy of radiation, radioactivity of the contaminated materials, and the practical means of performing excavation on this construction site. Areas exhibiting elevated gamma counts will be excavated, loaded directly into approved shipping containers, and shipped to Envirocare in Utah for disposal in accordance with S&P documents. Screening and verification sampling will document contaminated material removal in accordance with the Verification Sampling Program (Section 5.0) in this Work Order.

An additional screening of this urban fill will be performed following the asphalt stripping and the removal of the first five feet of the general site excavation. A pre-drilling test pit will be excavated through the fill soils to natural sands at each caisson location. The purpose is to explore for and remove obstructions which would interfere with the drilling of the caisson shafts. The test pits will probably be excavated with a backhoe. The excavation spoil will be screened with a 2 x 2 NaI gamma detector as described below in Section 2.4. Evidence of elevated gamma radiation will result in soil removal from the site. It is proposed that the contaminated material would be completely removed as encountered and prior to proceeding with the caisson drilling or backfilling of the test pit. Confirmation screening and verification samples will be obtained as described in Section 5.0 of this Work Order.

2.3.3 Known Thorium-Contaminated Soils

The area within the limits of Lake Lindsay is known to contain thorium-contaminated soils. The contaminated material was not previously removed because the shallow groundwater constrained excavating deeper. Borings and down-hole gamma logging documented residual contamination in sand at depths ranging from 13 feet to a maximum of 22 feet below street grade.

This contaminated material is covered by gravel and 3-inch stone that was placed after the previous excavation. The groundwater table will be lowered by pumping as described in Section 4.7 prior to excavation of the remaining contamination. As the gravel removal progresses to the level of the 3-inch stone, approximately 1 to 2 feet above the contaminated soil, the previously drilled boring locations will be surveyed to establish and verify the previously identified limits of Lake Lindsay.

The contaminated soil will be excavated in lifts as thick as 4 feet, where previous boring data indicate at least that thickness of contaminated material. Elsewhere, the excavation will be limited to the apparent thickness of the demonstrated contaminated soil, based on boring data. When apparently clean limits are reached based on gamma count screening of the excavation, verification samples will be obtained and radiological analyses performed.

The remainder of the sand soil within Lake Lindsay will be screened for contamination at 2 foot intervals as it is excavated to assess for potential contamination, similar to the methods discussed under Section 2.3.2, above.

2.4 Contamination Screening Methods

2.4.1 Gamma Detector Surveys

Gamma surveys will be performed with the new Ludlum model 193 with a 2 x 2 NaI probe. The Ludlum model 193 will alarm every 1/8 second with deviations from background. The instrument will be calibrated with the same methods and concentration standards used by Kerr-McGee to ensure it is capable of detecting 7.1 pCi/g in soil. A fixed alarm point will be set to indicate when 7.1 pCi/g is met or exceeded in this soil. This fixed alarm gives a constant audible and visual signal. This minimum detectable activity (MDA) is dependent on background radiation levels. If background radiation levels do not allow the instrument to meet this MDA, shielding will be added around the probe. Surveying soil using the Ludlum 193 with 2 x 2 NaI probe will use the same methodology whether the soil is still in place, in a backhoe bucket or on an auger.

2.4.2 Contamination Screening Methods - Analyzing Soil Samples

The on-site lab will be cross checked for comparison with Argonne National Laboratory using verification samples provided by Kerr-McGee to ensure soil sample results are consistent. After EPA review of the comparison analyses and approval, the on-site lab results will be used to verify that the area is clean. Subsequent results by Argonne will be the EPA documentation results. Verification samples may also be analyzed by Quanterra whose QAPP was previously submitted to EPA.

2.4.3 Contamination Reduction Zones (CRZ)

The release of items out of a CRZ will use equipment and practices to meet the criteria in NRC Regulatory Guide 1.86 for both alpha and beta-gamma contamination using SOP-345, Surveys for Surface Contamination and Release of Equipment for Unrestricted Use, from the S&P documents. Wipes will be analyzed as specified in this procedure with a fixed radiological counter in lab space on-site or at an immediately adjacent property.

and 2.3. That survey will be in general accordance with SOP-210 from the S&P Documents. However, this survey will not extend over those areas which were previously excavated and backfilled with clean granular fill. Background values will be determined through measurements in three locations where clean granular fill is present. Values which exceed this local background by a factor of 2 will be surveyed on a 1 meter grid.

Other previously unknown thorium-contaminated locations may be identified by the soil screening at 2 foot depth intervals as the site-wide excavation proceeds, screening of test pits at the caisson locations prior to the caisson drilling, or soil screening during excavation of portions of the slurry walls. These activities and their associated screening efforts are described in Section 4.0 of this Work Order. If and when contamination is noted in those areas, they will be included in the thorium contamination management program using the same methods as the previously known contamination in the Lake Lindsay area.

Thorium contaminated soil, that is soil which exceeds the total radium concentration threshold of 7.1 pCi/g, will be removed from the site. The contaminated material will be loaded into the same type of 20 cubic yard roll-off boxes that were previously used to transport soil from this site. These boxes are described in the Scoping and Planning documents at Section 01020, paragraph 3.5 (Transport of Contaminated Material); Section 01060, paragraph 1.4, Parts L., M., and P., (List of Codes and Standards); and Section 2200, paragraph 3.6, (Contaminated Material Loadout and Disposal). The soil will either be loaded directly into the boxes using excavating equipment after placement of appropriate liners, etc., or the material will be hand-excavated and loaded into Super Sacks, (lined, reinforced, 1 cubic yard fabric and membrane containers), which would be subsequently loaded into the transport boxes (20 cubic yard roll-off boxes) for shipping to the disposal site.

Excavated locations will be screened in accordance with SOP-223 from the S&P Documents, and notice given to EPA to screen the location for closure. Verification samples will be collected and submitted for analysis and results of that analysis obtained prior to EPA screening for closure.

4.0 EXCAVATION SEQUENCE, EQUIPMENT

4.1 Site Preparation

The site will be fenced at the beginning of construction. All utilities will be disconnected. All surface structures including light poles, parking attendant booths, parking ticket dispensers, temporary buildings, and signs will be removed from the site.

Staging areas and trailers will be arranged off-site. Exclusion zones will include the identified Lake Lindsay area and any other identified thorium-impacted soil locations. Contamination Reduction Zones (CRZ), i.e. decontamination areas, will be located adjacent to the contaminated areas in non-radioactive ("clean") areas to eliminate cross site contamination tracking. Site traffic routes, equipment and soil staging, and CRZ layout are expected to change as site development proceeds. The entire site will be under construction and initial site conditions will be addressed and clearly defined prior to work commencement, although they will be subject to change as construction proceeds.

Excavation and construction procedures involving potential contamination other than radioactive materials will follow OSHA health and safety requirements. Health and safety aspects beyond those which apply to the UAO and thorium contamination are addressed in the Health and Safety plan for the project. These items include excavation safety, potential petroleum contamination, traffic and heavy equipment safety, heat and cold exposure, falls (caisson excavations), engulfment (slurry wall) and confined space.

3.0 THORIUM-IMPACTED SOIL MANAGEMENT

A thorium-contaminated soil removal program was completed at this site in 1996 and 1997. Although all contaminated soils were supposed to be removed, groundwater interfered with deeper excavations in several areas. As a result, some contaminated soil that exceeded the contamination level of 7.1 pCi/g remained after the removal process. That area is referred to as "Lake Lindsay" and lies within the following clean limits: 30E to 75E, -5N to 35N (this station grid is in meters from a point at the southwest corner of the site). The depths of the remaining thorium-impacted soils in Lake Lindsay were identified through borings completed in that area (Figure 2). This is the principal area of concern with regard to management of thorium-contaminated soil and will be encountered during general site excavation, drilling of the caissons, basement excavation, and, potentially, during excavation of the slurry wall.

Thorium contamination was also documented beneath Illinois Street, and beneath the sidewalk along the west side of the site, on the east side of Columbus Drive. These locations are also shown on Figure 2. In that these areas are outside the proposed construction limits for the River East development, they are proposed to remain in place. A Highway Authority Agreement is being developed between the City of Chicago and the Responsible Parties, Kerr-McGee Chemical L.L.C. and River East L.L.C., to allow this material to remain in place. The provisions of this Agreement will provide for appropriate notification to protect the health and safety of utility workers and others who may excavate in these areas. A copy of the completed Agreement will be transmitted to EPA.

It is possible that as the general site excavation proceeds on this site, previously unidentified locations with thorium contamination may be encountered. These areas of thorium contamination may be found through gamma survey as described in Sections 2.2

4.2 Initial Site Excavation

The first excavation on site will lower the overall site elevation approximately 5 ft. The asphalt pavement and base course will be removed from portions of the site, beginning at the eastern one-third of the site with rubber-tired or tracked front-end loaders and loaded directly into semi-trailer dump trucks. No thorium contamination is expected within the asphalt or base course. Representative samples of the asphalt will be crushed on site and screened for gamma radiation, with samples submitted for radiological analysis. The material below the base course will be surveyed insitu using a 2 x 2 NaI (Tl) gamma detector. Survey methods are in accordance with SOP-210, with the following exceptions:

- The previously excavated and backfilled areas will not be surveyed.
- The site will be surveyed on an approximate 5 x 5 m grid spacing.
- Data stations will be marked and recorded with references to the site column lines so that stations can be reoccupied after each lift of excavation material is removed.

Soil handling procedures will be guided by the results of the surface gamma survey. In areas where no thorium contamination was detected, material may be removed without restriction in 2 foot lifts. Excavation will proceed and soil will be loaded into dump trucks and removed from site. This material will be field screened before excavation using the 2 x 2 NaI gamma detectors to document that it meets the criteria for management as uncontaminated soil. Screening methods and frequency are described in Sections 2.2, 2.3, 2.4 and 5.0. Similarly, when the removal of all identified contamination in the Lake Lindsay area is completed as a result of the later excavation, and the EPA has released the site as free of thorium contamination, restrictions on the thickness of the excavation lifts will no longer apply.

Gamma screening of the inplace soil using 2 x 2 NaI gamma detectors will be conducted at no greater than two foot depth intervals to a depth of minus five feet to document the absence of contamination. The lift limit (2 feet) is based on the effective exploration depth of the surface gamma survey, the anticipated distribution of the material within the lift, the type and energy of radiation and radioactivity of the contaminated material, and the practical means of performing excavation on this construction site. After the first lift is removed, the new surface will be resurveyed with the gamma detector to categorize soils contained in the next lift.

Where surface gamma measurements indicate thorium contamination is present, the material will be immediately excavated in one of the following methods: If the area is relatively small, i.e., less than 4 square meters, it will be excavated immediately; if the area is larger than 4 square meters, it will either be directly excavated as with smaller areas of contamination, or the vertical and horizontal extent of contamination will be determined by Geoprobe borings. Borings will be completed on 3-meter centers or narrower as appropriate to define the lateral limits of contamination and minimize uncontaminated soil removal. Borings will be down-hole screened in 6 inch increments to identify the vertical limits of contamination, and borings will be completed to 12 inches beyond the apparent limit of contamination. Contaminated soil will be excavated using hand tools, if the area is sufficiently small, or a backhoe with a maximum 1 cubic yard bucket. The limitation on bucket size is to allow loading into the 20 cubic yard transport boxes previously used at this site. Hand excavated material will be loaded into Super Sacks and then loaded into transport boxes. Each previously contaminated excavation will be screened, deemed clean by the Project Coordinator, and verified by EPA as clean.

Empty boxes will be staged off site. Boxes will be brought to the site as required and positioned adjacent to but outside the exclusion zone established in accordance with the S&P documents. Contaminated soil will only be removed from the site in transport boxes, the outsides of which have been surveyed clean as specified in the S&P documents, Section 02200, paragraph 3.6.

An air sampling program will be implemented during excavation activities in the fill soil to minus five feet and when excavating in the Lake Lindsay area where gamma radiation exceeds the remediation threshold of 7.1 pCi/g. As was specified in the previous soil removal effort, air sampling will be conducted near the margins and on all four sides of the site. This will provide coverage in the event of changing wind directions, which are common in the heavily developed downtown Chicago environment. Air monitoring is not proposed to be provided at the soil loading locations, because these will change throughout the day as excavation progresses. In that the Lake Lindsay contaminated soil load out is likely to be limited to a specific location, it is proposed to locate one of the perimeter stations near that soil loading station. A counting station for the air filters will be maintained in the site vicinity to provide immediate results. Personal air monitoring will also be conducted in accordance with the Lindsay Light Health & Safety Plan. The program will be conducted according to standards outlined in the S&P documents, Appendix B, document 102.

4.3 Caisson Installation

The perimeter caissons will be installed following the initial site stripping operation. Each caisson location will be explored with a test pit to remove obstructions. The test pit will be backfilled before the caisson is drilled. The caissons will be drilled with a standard caisson rig contracted through Morse-Diesel. Caisson shaft diameters on the perimeter caissons will range from 3.5 to 6.5 feet. Caisson depths will be 96 feet. Steel casing will be placed through the fill and sand portion of the caissons to maintain the diameter of the caissons as they are drilled. Casing is re-used from one caisson to another. The casing will be pulled as the caisson is filled with concrete.

It is possible the contamination in Lake Lindsay will not have been removed before caissons are drilled in that area. If contamination has not been removed, the following procedures will apply. Spoil from the augers will be screened using a 2 x 2 NaI gamma detector while the soil is still on the augers. The auger spoil will be spun-off into a stockpile for removal if clean or spun-off into a special container to collect contaminated spoil. The contaminated spoil can then be loaded directly into an approved transport container. Upon removal, the casing will be screened for thorium contamination. Thorium-contaminated casings will be decontaminated with a high pressure washer, surveyed clean, and reused.

It is likely that two crews will operate two separate caisson rigs, and travel in opposite directions around the perimeter line of caissons. Both crews will be health and safety trained and radiation trained. If contamination removal has not been completed, cuttings within Lake Lindsay will be screened from the base of the gravel backfill at about 12 feet to 25 feet below grade. Outside Lake Lindsay, cuttings will not be screened following the surveying of the test pit soils if no contamination is evident.

Upon completion of the perimeter line of caissons, the caisson crews and equipment will move to the interior caissons.

4.4 <u>Guide Wall Construction/Slurry Wall Excavation</u>

The slurry wall completely encompasses the site to a depth of 65 ft. The slurry wall serves as structural support for the excavation and as a cutoff for groundwater infiltration in the permeable upper fill and sand soils.

The purpose of a guide wall is to maintain the vertical and plan alignment of the slurry wall excavation and installation and confine the slurry as the excavation proceeds. The guide wall consists of a parallel set of concrete walls approximately 4 feet in total height, extending 1 foot above grade and 3 feet below grade. The walls are formed and poured prior to beginning the slurry wall panel excavation, and serve to keep the excavating equipment in line with the caissons and constrain the width of the slurry wall excavation. It should be noted that the majority of the fill material will be removed prior to beginning excavation of the slurry wall panels. Given the site-wide excavation, dropping the site grade by 5 feet and the guide wall extending an additional 3 feet, most of the 8 to 10 foot thick fills will be removed.

The slurry wall will be installed in panels excavated between two perimeter caissons. Panel excavation will proceed after the perimeter caissons have been completed, while the interior caissons are being drilled and placed. A generalized schematic showing typical slurry wall construction is presented as Attachment 3.

Two crews will proceed to install the slurry wall panels. Both crews will be health and safety trained and radiation trained.

Excavation of the slurry wall is conducted with a clam excavator. Screening of the material excavated in the Lake Lindsay area will occur at three points. First, screening will be conducted as soil from the fill material is excavated to 10 foot depth in the trench. This material will be screened in the clam excavator bucket as it is excavated. Screening will be conducted with 2 x 2 NaI gamma detector. Material exhibiting elevated gamma radiation above the 7.1 pCi/g threshold level will be placed in a staging area on plastic liners to drain before placement in a transport box. Run-off from the clam shell spoil which is determined to be contaminated will be contained with portable berms, and directed to the water collection system prior to discharge to the MWRDGC. Water will be treated according to

MWRDGC guidelines before being discharged. Specific procedures for handling this material are described in Section 4.7. The soil staging area and water drainage pathway will require screening and clearance following removal of the contaminated trench spoil.

The second screening will occur as the slurry from panels in the Lake Lindsay area is cleaned of suspended sediment prior to placement of the concrete into the trench. The sediment suspended in the slurry is removed in a desanding operation. The desanding operation will consist of an air-lift vacuum tube placed to the bottom of the panel, a shaker screen to separate the larger sediment particles from the slurry, and cyclone separators to separate the liquid from the suspended sediment. The system generally operates by vacuuming the slurry from near the bottom of the panel. The slurry is discharged over the shaker table with the liquid fraction dropping through the shaker screen and the solid fraction accumulating in a pile on the ground. That pile can be screened with hand held instruments before being loaded into either a dump truck, if clean, or the 20 cubic yard transport boxes, if contaminated. The liquid phase is run through cyclone separators with the cleaned liquid slurry discharged back to the trench and the solid phase discharged across the top of the shaker table to accumulate on the ground with the other soil solids. When the panel is filled with concrete, the displaced slurry is temporarily stored in tanks for use in the next panel. Screening will be performed as the sediment is periodically removed from the soil pile with a front end loader or backhoe.

The third opportunity for screening will be through daily sampling of the homogenized slurry which will be screened for gamma radiation while excavating in the Lake Lindsay area.

4.5 Site-wide Excavation

Once the caissons are completed at one end of the site, the general site excavation will proceed across the site to a depth approximately 15 feet below the current site grade. The depth of the excavation will be somewhat constrained until the slurry wall is completed and the site is dewatered. Excavation is not proposed to proceed below water. The excavation will proceed according to the guidelines described for the initial site excavation. This includes unrestricted removal of soils from areas deemed uncontaminated. The lateral extent of areas with elevated gamma readings (>7.1 pCi/g) will determine subsequent soil excavation procedures.

Once the excavation is verified as clean by the EPA, the first sublevel floor slab will be poured, followed by the street level floor slab immediately above. The remaining sublevels will be excavated beneath the first sublevel floor slab to a maximum depth of 56 feet.

Within the Lake Lindsay area, the gravel backfill used to fill the former excavation will be excavated without screening. Excavation crews will know they are nearing the bottom of the previous excavation when they reach the 3 inch stone layer. When sand is reached, the excavation face and floor will be surveyed to identify any remaining thorium-contaminated material. That material will be excavated, transported to the load-out location, and loaded directly into transport boxes.

4.6 Tower Core Excavation

The tower core for the east tower will be excavated within a cofferdam structure. The excavation will proceed to a depth of 65 feet, and then proceed with construction of the shear wall structure. This excavation will be conducted with backhoes and hydraulic excavators. Soils will be screened to a depth of minus five feet and disposed according to the procedures outlined above for the site-wide excavation. Areas exhibiting elevated gamma radiation will be excavated, the resulting clean excavation screened, confirmation samples obtained and analyzed, and subsequently verified clean by EPA. Normal excavation will then proceed.

4.7 Water Management

Most excavation activities below the water table at approximately 12 feet below street level will require some level of water management. Construction activities will intercept groundwater contained in the soil below the water table within the limits of the slurry wall. Water may enter the site through the slurry wall, infiltrate up through the clay soil, or collect as a result of rain and run-on. In all cases, water will be removed from the site via approved discharge methods.

It is proposed to discharge the water under permit to the Metropolitan Water Reclamation District of Greater Chicago (MWRDGC) combined sewer system. Morse-Diesel, the construction manager for the River East development, is proceeding to secure authorization from MWRDGC for this discharge. The proposed system is a series of settling baffles to drop out suspended sediment. A schematic of the settling basins is attached as Attachment 4. Prior sampling by Kerr-McGee of water in Lake Lindsay showed no radioactivity above background in the water. Removal of suspended sediment is anticipated to be sufficient to meet pre-treatment standards. The water will be treated, if necessary, to meet the pre-treatment standards set by the MWRDGC. Monitoring of the effluent from the treatment system will be conducted as specified by MWRDGC. The sediment collected in the settling basins will be screened for elevated radiation before disposal, and any material containing contamination above 7.1 pCi/g will be disposed with the contaminated soil at Envirocare of Utah.

Water will be removed via a series of 8 dewatering wells and the water level lowered through pumping prior to the excavation reaching the depth of the water table. The distribution of the dewatering wells is shown on Attachment 4. It is likely that pumping will occur from a limited number of wells at one time. Some of the water may be recycled on site for dust control.

5.0 VERIFICATION SAMPLING PROGRAM

In order to demonstrate that the base and sides of contaminated soil excavations meet cleanup criteria described in the Unilateral Administrative Order (UAO), a verification/field sampling program must be implemented during the excavation of contaminated materials.

The verification survey and sampling program will be conducted in general accordance with SOP-106 from the S&P documents. Some revisions to that SOP are appropriate as noted below:

1. No reference to witness points or permanent structures from prior surveys will be possible due to the entire site being excavated. Reference stations will be resurveyed on the excavation floor to reestablish the site grid relative to the site column lines. (The site grid references the previously established grid stationing in meters whose origin is at the southwest corner of the site.)
2. The entire excavation is not to be included in the verification survey and sampling program. Only those areas which are identified as exhibiting contamination levels above the 7.1 pCi/g threshold and the surrounding area for a distance of 2 meters will be included. In other words, although the entire site will be covered by the screening gamma survey, only areas which were found to exceed the 7.1 pCi/g threshold will be sampled and analyzed to verify clean closure.

The entire Lake Lindsay area within the limits of 30E to 75E and -5N to 35N, will be included in the verification sampling program.

These procedures are specifically designed for the Lake Lindsay area, but will also be applied to other excavation activities on site if they are discovered to be contaminated. Dust will be controlled and monitored throughout excavation activities in exclusion zones according to procedures described in the Quality Assurance Project Plan and the Air Monitoring portion of the Health and Safety Plan. The verification sampling program will test for total radium (Ra-226 and Ra-228) only, and is representative of the entire U-238 and Th-232 decay series encountered on site.

Sample screening and clean up verification will be conducted through on site surveys with direct measurements of gamma radiation (2 x 2 NaI(Tl) gamma detector; Ludlum Model 193 portable scaler ratemeter analyzer) in accordance with SOP-210, and through analysis at an approved on-site laboratory.

5.1 Initial Site Excavation

Before the initial excavation begins, the limits of the previous excavations will be marked on the asphalt surface. Within those limits, the asphalt and underlying fill are new and uncontaminated. Elsewhere on-site, the asphalt and base course gravel will be surveyed with 2 x 2 NaI gamma detectors as they are stripped. The nature of the asphalt will not allow contamination surveys using wipes to be taken. The asphalt rubble will resemble soil and representative samples will be taken and analyzed as Kerr-McGee did in the previous remediation effort. The asphalt and soil will be disposed as required based upon the results of their screening.

Any large, greater than 1 meter square, debris to be removed, typically concrete walls and slabs present below the asphalt pavement, will be surveyed in accordance with SOP-345, Surveys for Surface Contamination and Release of Equipment for Unrestricted Use, from the S&P documents. Screening will include frisking and wipe samples.

Excavation activities will begin with the site-wide removal of asphalt and 5 feet of soil. The excavated surface, after removal of the asphalt and base course and prior to removal of the 5 feet of soil and fill materials, will be surveyed for gamma radiation. Any materials with gamma readings indicating levels of contamination greater than 7.1 pCi/g will be removed as contaminated. Refer to Section 2.2 and 2.3 above for survey procedures. Contaminated soils will be disposed off site according to procedures in the S&P documents.

Each area of elevated gamma radiation will be delineated as an exclusion zone with colored rope in accordance with the S&P documents. Upon removal of the contaminated interval (as indicated by surface screening of the excavation base), samples will be recovered in accordance with SOP-214-1. These samples will be analyzed at an on-site lab for verification. Sample analysis is to be conducted on an expedited basis. When all apparent contamination has been removed, a pre-verification survey will be completed. If the excavation is found to be clean, EPA will be requested to verify the clean closure of the excavation. Verification samples may also be submitted to Quanterra, whose QAPP was previously submitted. Documentation will be in accordance with SOP-223.

Caisson Installation

A total of 137 caissons are to be installed on site. Caissons will first be installed along the perimeter, then on the interior of the site, proceeding from one end to the other. The area around each interior caisson will be dug to the bottom of the urban fill (10-12 feet) to ensure there is no debris that would impede drilling. This soil will be surveyed in the backhoe bucket or on the excavated soil stockpile. The spoil from the caisson augers drilled in known or suspected contaminated areas in Lake Lindsay will be field screened as the soils are brought to the surface, and soils will be distributed based on these measurements.

If the field screening indicates contamination levels above the cleanup criteria, radiation-trained laborers will place that soil into approved containers, the HP will release the auger using SOP-345, Surveys for Surface Contamination and Release of Equipment for Unrestricted Use, from the S&P documents to meet the criteria in NRC Regulatory Guide 1.86 for both alpha and beta-gamma contamination and the radiation-trained auger crew will resume drilling. The depth interval exhibiting contamination will be recorded for each caisson encountering elevated thorium concentrations.

During caisson installation, a steel casing is used to maintain the diameter of each caisson through the fill and sand section until it is filled with concrete. Once the concrete is placed, the casings are removed. For this investigation, the casings will be screened upon removal and decontaminated as necessary.

Caisson augers will be decontaminated after any contaminated holes and at the end of each contaminated zone within a caisson hole. Decontamination procedures are outlined in SOP-LLII-347, and involve removing any contaminated soil from the augers.

Guide Wall Construction/Slurry Wall Excavation

The slurry wall will be installed around the perimeter of the site, and is constructed in panels between adjacent perimeter caissons.

Excavation will be completed using a clam excavator. The only contamination expected is located within two panels at the south end of Lake Lindsay. Any contaminated material at depths shown on Figure 2 will be handled in accordance with this Work Order. All other slurry wall excavations will be handled as clean. Materials where gamma radiation levels indicate radium soil concentrations above the cleanup criteria will be placed in a staging area or roll-off box to drain. Drainage will be directed to the groundwater collection wells and treated per the discharge permit before being discharged. The empty clam will then be screened to determine if any residual contaminated soils remain. If contaminated soils remain on the clam, it will be decontaminated in the soil staging area using a high pressure washer to remove all contamination.

As the trench is filled with concrete, the sediment is removed from the slurry in a desanding operation. The sediment from the two panels south of Lake Lindsay will be screened for radiation levels, and distributed accordingly as clean or contaminated material. When all contaminated materials are dry, they will be transported off site, and the staging area will be screened. Representative samples will be analyzed in the on-site lab for confirmation.

Site-wide Excavation

The second site-wide excavation will proceed following caisson installation and slurry wall construction. When prior screening has demonstrated the removal of all contaminated soil, this phase of excavation will be unrestricted. Soil handling procedures will be determined by the lateral extent of areas with elevated gamma readings.

Within the Lake Lindsay excavation, removal of the gravel backfill will proceed without screening. Upon exposure of the walls and floor of the excavation, the boreholes previously drilled which exhibited contamination will be located to ±0.5 meter horizontally. Excavation will proceed at those locations to remove any uncontaminated overburden.

Upon excavation to the apparent depth of the base of contamination in Lake Lindsay, the excavation will be surveyed in accordance with SOP-223. Soil samples will be collected at the base and along the walls of the excavation for confirmation by the on-site lab. After these results show no contamination above 7.1 pCi/g, the excavation will be verified clean by EPA.

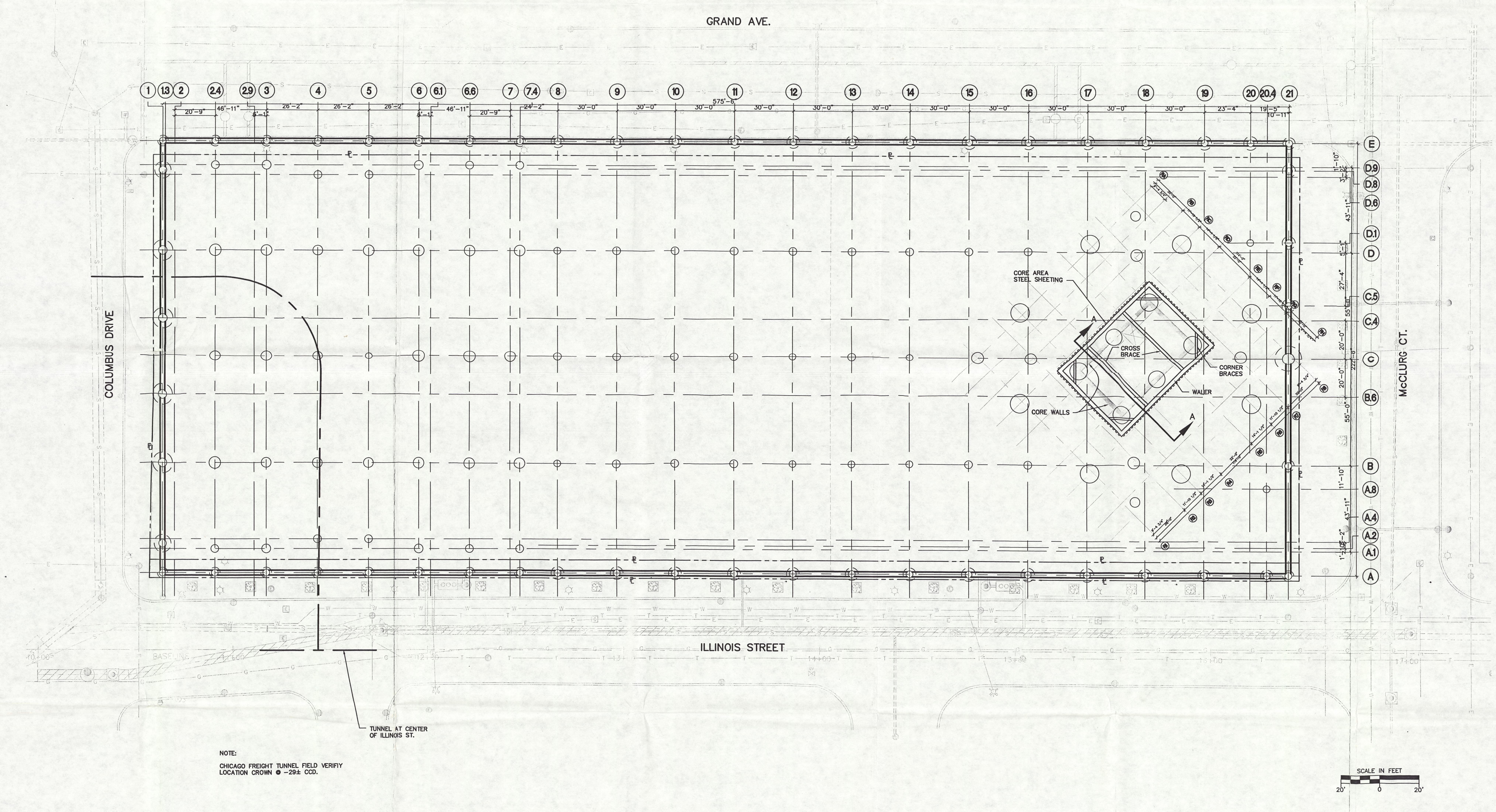
Tower Core Excavation

The core of the east tower will be excavated to a depth of 65 ft. while the caisson installation proceeds on the western portion of the site. The excavation will be completed using backhoes and hydraulic excavators. Because of the depths involved, excavated soils will be handled according to procedures used for clean soils. Gamma screening will be limited to the upper five feet of soil, or to the depth at which clean soils are verified by EPA, if contamination is encountered.

STS CONSULTANTS, LTD.

FIGURES

FIGURES



CAISSON AND SLURRY WALL PLAN

RIVER EAST CENTER
MIXED USE DEVELOPMENT
300 EAST ILLINOIS STREET
CHICAGO, ILLINOIS

DRAWN BY	GRS	DATE	4-13-98
CHECKED BY	EJ	DATE	4-13-98
APPROVED BY	EJ	DATE	4-13-98

REVISION NO.	DESCRIPTION	DATE	BY
2	GENERAL REVISION	5/27/98	EJ
1	B.O.U. ISSUE	5/05/98	EJ

RIVER EAST CENTER

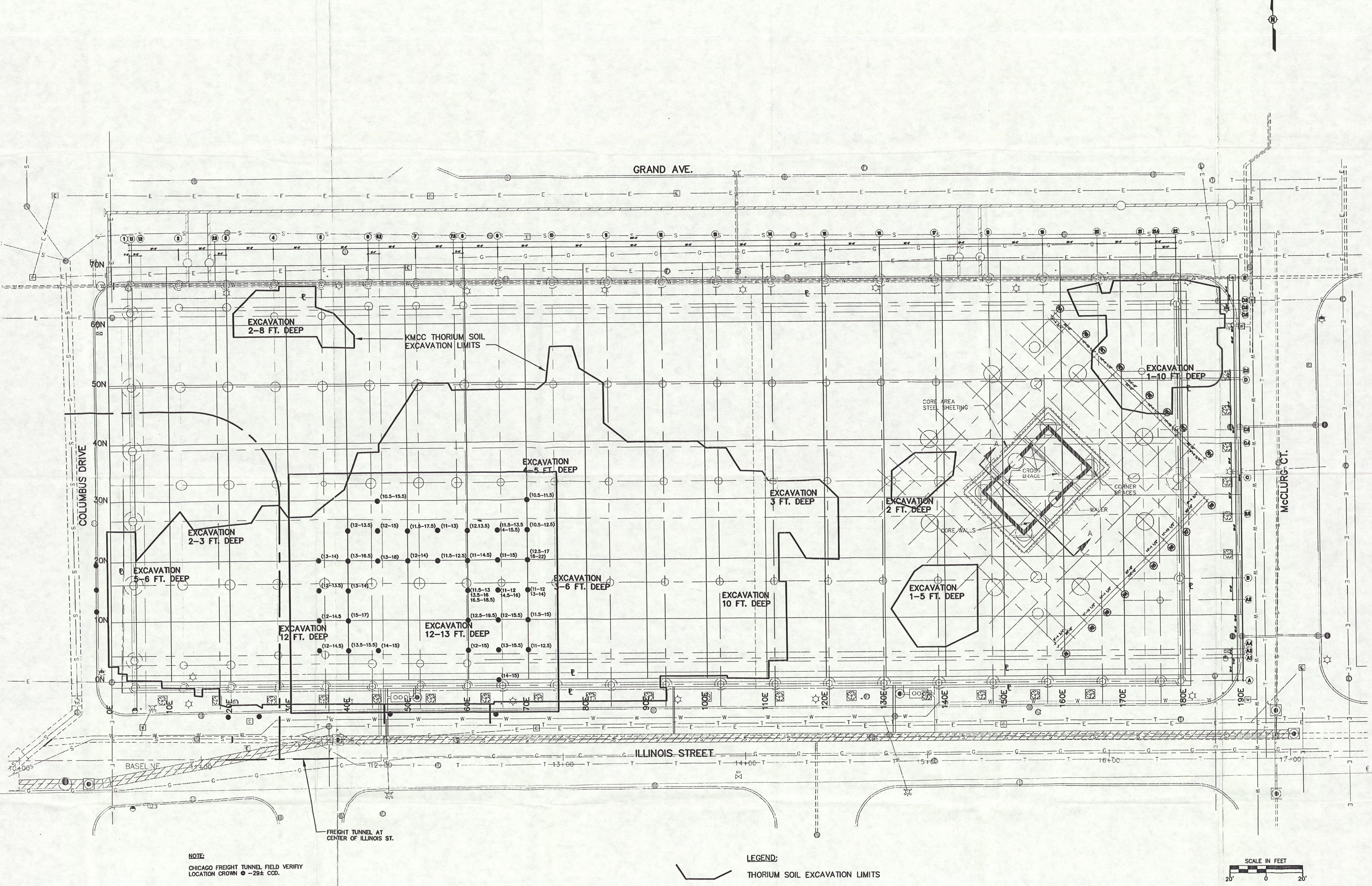
CASE FOUNDATION COMPANY
A KELLER COMPANY
Caissons • Piling • Slurry Wall/Trenches
P.O. Box 40 1325 West Lake St. Roselle, IL 60172 630-529-2911

STS PROJECT NUMBER
29746

STS PROJECT FILE
G1PLAN.dwg

SCALE
AS SHOWN

FIGURE 3



NOTE:
CHICAGO FREIGHT TUNNEL FIELD VERIFY LOCATION CROWN ⊕ –29± CCD.

LEGEND:
THORIUM SOIL EXCAVATION LIMITS
● THORIUM EXCEEDING 7.2 pCi/gm
(16.4–23.9) DEPTH OF CONTAMINATED SOIL
1–5 APPROXIMATE DEPTH OF EXCAVATION

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1	FOR CLIENT REVIEW	6/24/98	WHW	
REVISION NO.	DESCRIPTION	DATE	BY	

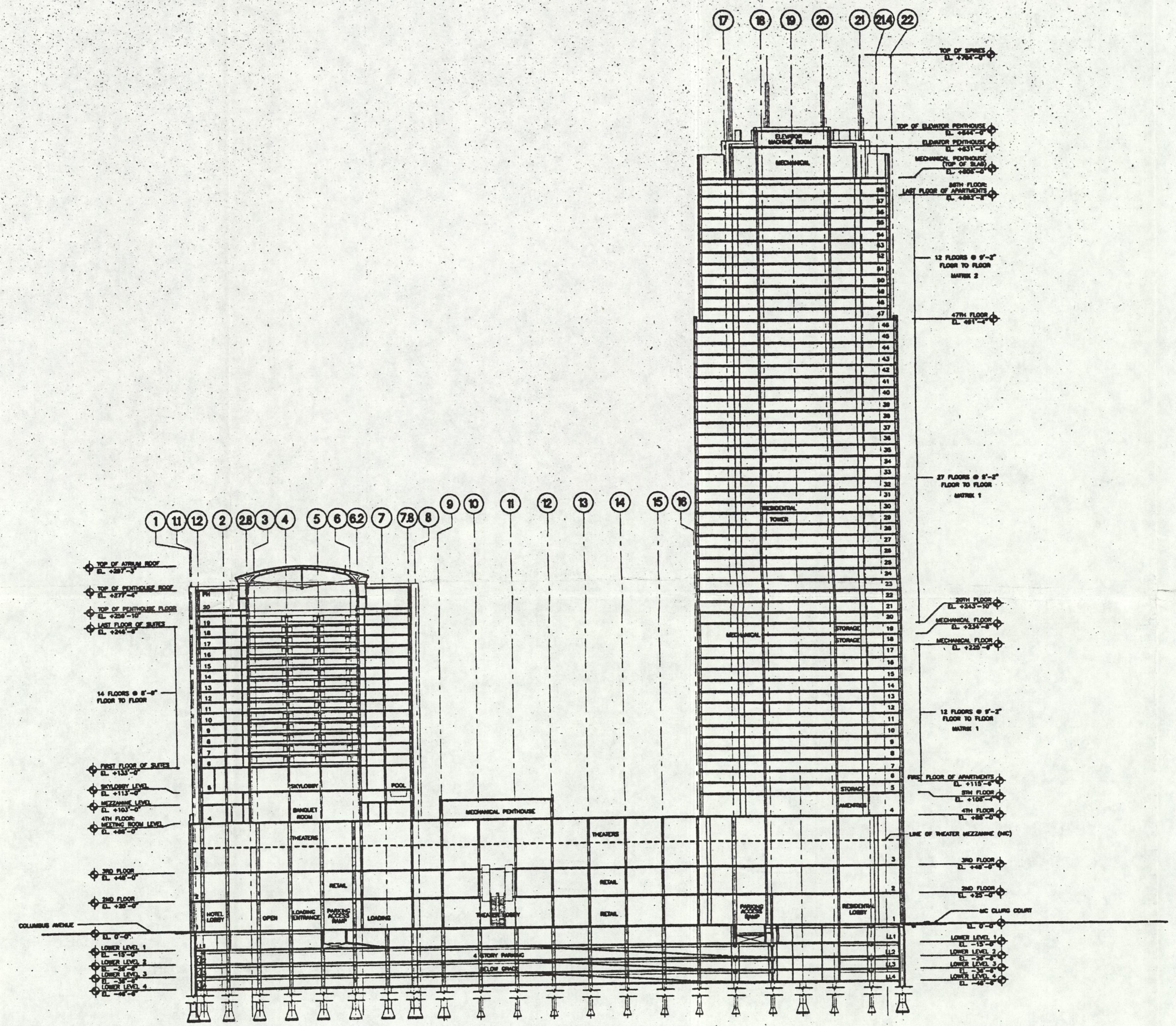
DRAWN BY GRS DATE 4–13–98
CHECKED BY RGB DATE 4–13–98
APPROVED BY WHW DATE 4–13–98
CADFILE X:\PROJECTS\24418\RR\G1THORIUM.dwg 05/21/1665 0:16

THORIUM CONTAMINATION
RIVER EAST CENTER
MIXED USE DEVELOPMENT
300 EAST ILLINOIS STREET
CHICAGO, ILLINOIS

RIVER EAST

STS Consultants Ltd.
Consulting Engineers

STS PROJECT NUMBER 24418–RR
STS PROJECT FILE G1THORIUM.dwg
SCALE AS SHOWN
FIGURE 2



J10 EAST - WEST SECTION

SCALE 1/32" = 1'-0"

RIVER EAST CENTER

RIVER EAST CENTER
MIXED USE DEVELOPMENT
300 EAST ILLINOIS STREET
CHICAGO, ILLINOIS

RIVER EAST, L.L.C.
DEVELOPER

DE STEFANO PARTNERS

Chris P. Stefanos + Associates
STRUCTURAL ENGINEERS

McClier Corporation
CIVIL ENGINEERS

WMA Consulting Engineers, Ltd.
MEP ENGINEERS

BUILDING SECTIONS
EAST - WEST

MAY 15, 1998

| FIGURE

1674

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S T S   C O N S U L T A N T S ,   L T D .

ATTACHMENTS

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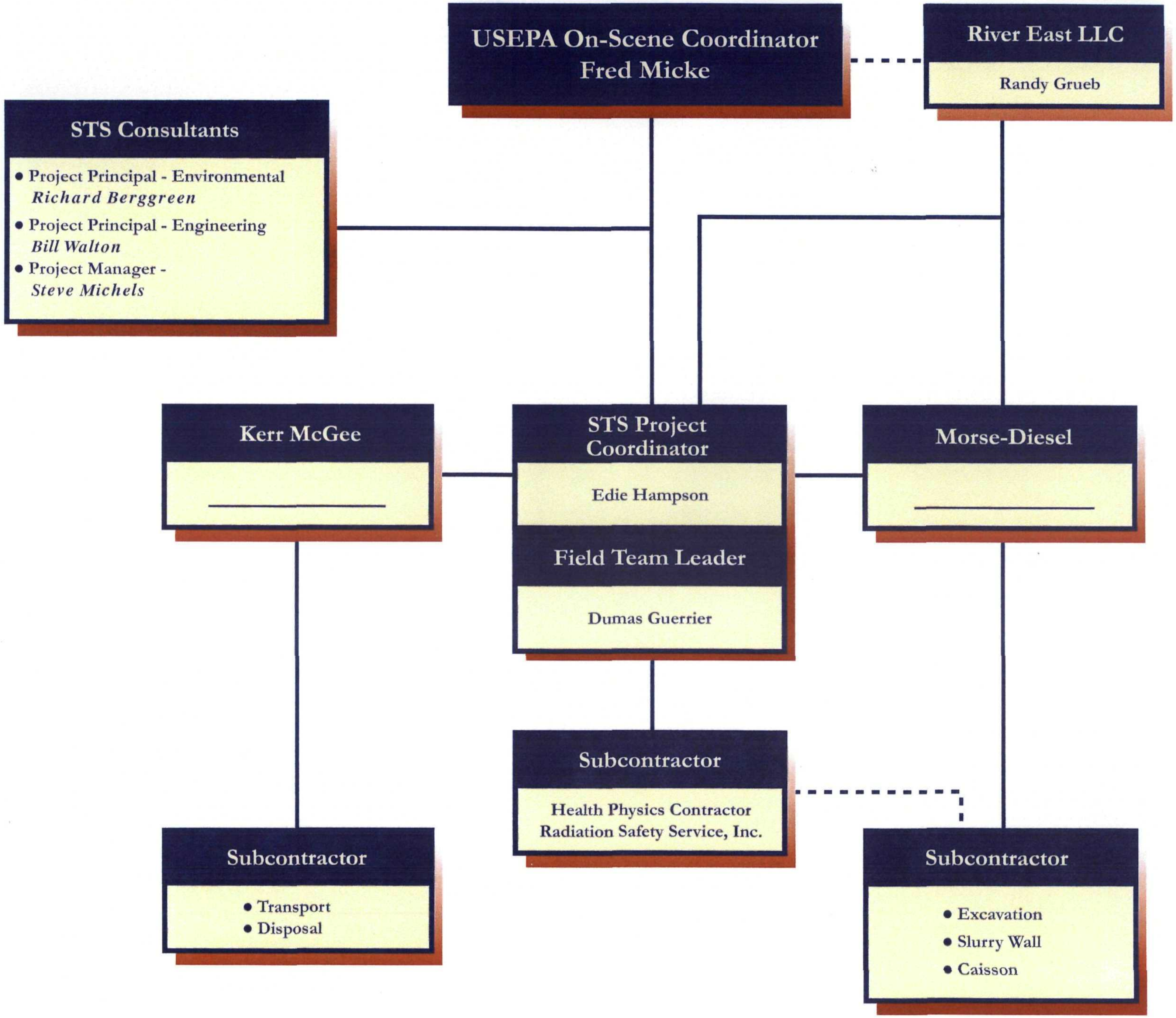
ATTACHMENT 1

PROJECT ORGANIZATION CHART

Attachment 1



ATTACHMENT I

Project Principal

Responsible for client contact and overall schedule coordination. Contractual arrangement with subcontractor Health Physics provider. Internal STS Consultants staffing and resource allocation, coordination between environmental services and geotechnical engineering services within STS. Communications and coordination with Kerr-McGee L.L.C.

Project Coordinator

1. Project Coordinator will also be the STS Health and Safety Coordinator with the responsibilities as described in the Health and Safety Plan.
2. Will provide oversight of excavation, slurry wall, and caisson contractors operations to confirm that the work is done in compliance with these Work Order provisions. This will include confirmation of material handling procedures, review of water discharge tests, and operation of dewatering system. Will be assisted by the Field Team Leader, Health Physics Subcontractor and STS Technicians as required. Provide documentation consisting of daily reports of activities (form attached), issues raised, corrective actions, volumes of material handled (clean/contaminated).
3. Oversight of Health Physics Subcontractor to confirm monitoring is in compliance with Work Order. Confirmation to consist of:
    - Air monitoring data review daily.
    - Equipment calibration records review weekly.
    - Directing survey of active excavation zones, i.e., slurry wall, caissons, general site excavation, for evidence of radioactive contamination.
    - Document appropriate personnel monitoring with TLDs by HP contractor.
    - Review H&S Plan procedures.
4. Maintain records of clean soil removal including applicable test results, and records of thorium-contaminated soil shipped through Kerr-McGee L.L.C.
5. Notify EPA when excavations have apparently reached clean limits. Request EPA certifications for closure.
6. Prepare monthly progress/status reports under UAO for EPA.
7. Project Coordinator will be authorized to direct contractors and subcontractors to comply with the procedures outlined in the Work Order. All contractors and subcontractors will be provided with a copy of the Work Order. The Project Coordinator will be authorized to stop work in the event a contractor or subcontractor is unable or unwilling to proceed in compliance with these procedures. The Project Coordinator is not responsible for the means and methods of the construction project except to the extent necessary to comply with the material handling specifications in this Work Order, referenced Scoping and Planning Documents, and the Health and Safety provisions in the Health and Safety Plan.

ATTACHMENT 2

PROJECT REVISED HEALTH & SAFETY PLAN

RIVER EAST L.L.C.
LINDSAY LIGHT II PROJECT
HEALTH & SAFETY PLAN

Title:	Health & Safety Plan
Revision No:	0
Approved By:	
Date:	December 11, 1998

RIVER EAST L.L.C.
LINDSAY LIGHT II PROJECT
HEALTH & SAFETY PLAN

Submitted to:

U.S. EPA Region V

Office of Superfund

Richard G. Berggreen
Project Principal

Date 3/4/99

Edie Scala-Hampson, CIH, CHMM
Project Coordinator,
Health & Safety Coordinator

3-4-99
Date

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IN THE EVENT OF AN EMERGENCY DIAL: 911

AMBULANCE SERVICE	911
FIRE DEPARTMENT	911
EMERGENCY RESCUE SERVICE	911
POLICE DEPARTMENT	911
NATIONAL RESPONSE CENTER	1-800-424-8802
CHEMTREC	1-800-424-9300
POISON CONTROL CENTER	1-800-732-2200
NORTHWESTERN MEMORIAL HOSPITAL	(312) 908-2000
ILLINOIS DEPARTMENT OF NUCLEAR SAFETY (IDNS) EMERGENCY NUMBER	(217) 785-0600
STS PROJECT PRINCIPAL	(847) 279-2472
ILLINOIS EMERGENCY MANAGEMENT	(217) 782-7860
U.S. EPA REGION V 24-HOUR EMERGENCY NUMBER	(312) 353-2318

1. SCOPE OF PLAN

The following Health and Safety Plan (HASP) will be utilized and modified as necessary in order to minimize and prevent exposures to hazardous substances and conditions related to all excavation and restoration activities at the Lindsay Light II Site (Site). All personnel assigned to this project will be required to review thoroughly the contents of the HASP and to strictly adhere to the policies and procedures listed herein. This HASP is for use only by the Respondents, River East LLC and Kerr-McGee LLC (Kerr-McGee), their designated contractors and consultants, and approved Site visitors. U.S. EPA, and other agencies, are not considered visitors and will be required to conform to their own Health and Safety Plans.

This plan meets the requirements of OSHA 29 CFR 1910.120, Hazardous Waste Operations and Emergency Response, and applicable subparts of OSHA 29 CFR 1926, 1910 and 10 CFR. Visitors will be required to review the health and safety plan and read and sign the visitor information sheet (Figure 1.1).

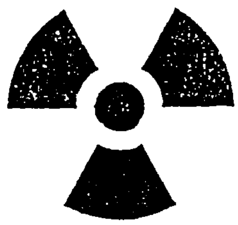
FIGURE 1.1
VISITOR INFORMATION SHEET

LINDSAY LIGHT II SITE

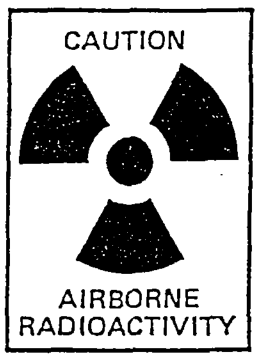
KM-4792

VISITOR INFORMATION

NOTICE TO VISITOR: ALL VISITORS MUST BE ESCORTED AT ALL TIMES WHILE ON THIS SITE.

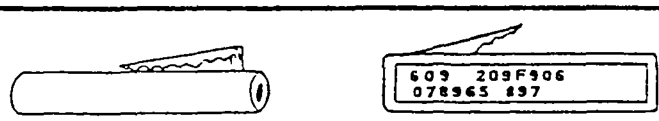


CAUTON. Radioactive materials are present on this site. Radioactive materials may be found throughout the site. Grounds, buildings and equipment have low levels of contamination.



CONTROLLED AREAS: Do not enter areas with these signs unless you have an escort or health physics has given specific approval and you understand access limitations.

You must wear protective clothing in controlled areas. Health physics will provide you with instructions.



You must wear a personal radiation dosimeter if you enter an area which is controlled.

No smoking, eating, drinking or chewing in controlled areas.
NO EXCEPTIONS.

You may request to see radioactive materials license for this facility as granted by the USNRC.
Notify Health Physics if you do not understand these instructions.

NAME ______________________ DATE ____________

2. SAFETY MANAGEMENT

The following safety management structure will be utilized for the implementation, administration, and monitoring of the HASP.

2.1 HEALTH AND SAFETY COORDINATOR

The Health and Safety Coordinator (HSC) shall assume overall responsibility for the HASP. The HSC or designee shall monitor and maintain quality assurance of the HASP until project completion. Principal duties of the HSC include:

- Review project background data,
- Approve all HASP modifications,
- Administer and enforce the HASP,
- Evaluate the adequacy of personal protective equipment (PPE) to be used by Site personnel,
- Conduct required on-site training except tailgate safety meetings that will be conducted by the Field Team Leader,
- Brief visitors on work Site conditions, and
- Administer personnel and ambient air monitoring procedures.

The HSC or designee has the authority to stop work in the event conditions develop which pose an unreasonable risk to Site personnel or persons in the vicinity.

3. PERSONNEL RESPONSIBILITIES

The HSC or designee will administer and supervise the HASP at the work-site level. He will monitor all operations and will be the primary on-site contact for health and safety issues, and will have full authority to stop operations if conditions are judged to be hazardous to on-site personnel or the public.

The HSC will brief all Site personnel on the contents of the HASP. Personnel will be required to review the HASP, and have the opportunity to ask questions about the planned work or hazards. The Field Team Leader will conduct tailgate safety meetings to familiarize the Site personnel with Site conditions, boundaries, and physical hazards. Site personnel will conduct their assigned tasks in accordance with the HASP at all times.

If at any time Site personnel observe unsafe conditions, faulty equipment or other conditions which could jeopardize personnel health and safety, they are required to immediately report their observations to the HSC or Field Team Leader.

Work zones will be established at the Site. These zones include clean/support zones, decontamination zones, and exclusion zones. Although the clean/support zones are anticipated to remain fixed, other zones will move about the Site as drilling and excavation work progresses. Figure 3.1 shows the impacted areas where exclusion zones may be established during excavation activities.

4. HAZARD ASSESSMENT

The following represents potential hazards associated with this project.

4.1 PRINCIPAL CONTAMINANTS (KNOWN OR SUSPECTED)

- Thorium
- Uranium
- Radium
- Radon

The contaminants are present in the soil at low concentrations. These primary routes of entry to the body will be considered:

ROUTE	ENTRY MADE VIA:
Inhalation:	Airborne dust containing heavy metal radionuclides.
Ingestion:	Airborne dust containing heavy metal radionuclides/contaminants. Improper or poor personal hygiene practices.
Eye and Skin:	Direct contact with contaminants. Improper or poor personal hygiene practices. Airborne dust containing heavy metal/radionuclide contaminant. Cuts and abrasions.
Direct Exposure:	Penetrating gamma radiation in air and soil.

4.2 PHYSICAL HAZARDS

Before field activities begin, the HSC will conduct a Site reconnaissance to identify any real or potential hazards created from Site activities. Physical hazards inherent to construction activities and power-operated equipment may exist.

4.2.1 Heat Stress

Field activities in hot weather create a potential for heat stress. The warning symptoms of heat stress include fatigue; loss of strength; reduced accuracy, comprehension and retention; and reduced alertness and mental capacity. To prevent heat stress, personnel shall receive adequate water supplies and electrolyte replacement fluids, and maintain scheduled work/rest periods.

The Field Team Leader or designee shall continuously visually monitor personnel to note for signs of heat stress. In addition, field personnel will be instructed to observe for symptoms of heat stress and methods on how to control it. One or more of the following control measures can be used to help control heat stress.

- Provision of adequate liquids to replace lost body fluids. Employees must replace body fluids lost from sweating. Employees must be encouraged to drink more than the amount required to satisfy thirst, 12 to 16 ounces every half hour is recommended. Thirst satisfaction is not an accurate indicator of adequate salt and fluid replacement. Replacement fluids can be commercial mixes such as Gatorade.

- Establishment of a work regimen that will provide adequate rest periods for cooling down. This may require additional shifts of workers.

- Breaks should be taken in a cool and shaded rest area (77 degrees is best).

- Employees shall remove impermeable protective garments during rest periods.

- Employees shall not be assigned other tasks during rest periods.

- All employees shall be informed of the importance of adequate rest, acclimation, and proper diet in the prevention of heat stress.

4.2.2 Cold Stress

Field activities are not anticipated during cold weather; however, if the field activities occur during a period when temperatures average below freezing, the following guidelines will be followed.

Persons working outdoors in temperatures of 40 degrees and below may suffer from cold exposure. During prolonged outdoor periods with inadequate clothing, effects of cold exposure may even occur at temperatures well above freezing. Cold exposure may cause severe injury by freezing exposed body surfaces (frostbite) or result in profound generalized cooling, possibly causing death. Areas of the body which have high surface area-to-volume ratios such as fingers, toes and ears are the most susceptible to frostbite.

Two factors influence the development of a cold injury: ambient temperature and the velocity of the wind. Wind chill is used to describe the chilling effect of moving air in combination with low temperature. For instance, 10° F with a wind of 15 miles per hour (mph) is equivalent in chilling effect to still air at -18°F.

As a general rule, the greatest incremental increase in wind chill occurs when a wind of 5 mph increases to 10 mph. Additionally, water conducts heat 240 times faster than air. Thus, <u>the body cools suddenly when external chemical-protective equipment is removed if the clothing underneath is perspiration-soaked</u>.

Local injury resulting from cold is included in the generic term "frostbite". There are several degrees of damage. Frostbite of the extremities can be categorized into:

- <u>Frost nip or incipient frostbite</u>: Characterized by sudden blanching or whitening of skin.
- <u>Superficial frostbite</u>: Skin has a waxy or white appearance and is firm to the touch, but tissue beneath is resilient.
- <u>Deep frostbite</u>: Tissues are cold, pale, and solid; extremely serious injury.

<u>Prevention of frostbite is vital</u>. Keep the extremities warm. Wear insulated clothing as part of one's protective gear during extremely cold conditions. Check for symptoms of frostbite at every break. The onset is painless and gradual--you might not know you have been injured until it is too late.

<u>To administer first aid for frostbite</u>, bring the victim indoors and rewarm the areas <u>quickly</u> in water 95° to 100°F. Give individual a warm drink--not coffee, tea, or alcohol. The victim should not smoke. Keep the frozen parts in warm water or covered with warm clothes for 30 minutes, even though the tissue will be very painful as it thaws; then elevate the injured area and protect it from injury. Do not allow blisters to be broken. Use sterile, soft, dry material to cover the injured areas. Keep victim warm and get <u>immediate</u> medical care.

4.2.3 Electrical Hazards

Overhead power lines, downed electrical wires, buried cables and improper use of electrical extension cords can pose a danger of shock or electrocution. All Site personnel should immediately report to the Field Team Leader any condition that could result in a potential electrical hazard.

The Field Team Leader will notify Site personnel during the safety meetings of the locations of known underground cables and utilities.

4.2.4 Noise Hazard

Operation of equipment may present a noise hazard to workers. Site personnel will utilize hearing protection when noise levels are determined to be in excess of 29 CFR 1910.95 requirements. Noise monitoring will be performed to determine noise levels.

4.2.5 Overt Chemical Exposure

Typical response procedures include:

SKIN CONTACT:	Use copious amounts of soap and water. Wash/rinse affected area thoroughly, then provide appropriate medical attention. Eye wash will be provided on-site at the work zone and support zone as appropriate. If affected, eyes should be continuously flushed for a minimum of 15 minutes.
INHALATION:	Move to fresh air and transport to hospital. Decontaminate as other actions permit.
INGESTION:	Transport to emergency medical facility. Decontaminate as permitted by other requirements.
PUNCTURE WOUND OR LACERATIONS:	Transport to emergency medical facility. Field Team Leader will provide Material Safety Data Sheets (MSDS) to medical personnel as requested. Decontaminate as permitted by other requirements.

4.2.6 Adverse Weather Conditions

In the event of adverse weather conditions, the Field Team Leader will determine if work can continue without endangering the health and safety of field workers. Some items to be considered before determining if work should continue are:

- Potential for heat stress and heat-related injuries.
- Potential for cold stress and cold-related injuries.
- Treacherous weather-related working conditions.
- Limited visibility.
- Potential for electrical storms or high winds.

4.3 MEDICAL EVALUATION AND SURVEILLANCE PROGRAM

All field project personnel shall receive a medical evaluation in accordance with 29 CFR 1910.120 and Appendix A. Personnel who receive a medical evaluation will be notified by the medical contractor as to the outcome of their evaluation. This will be in the form of a confidential report addressed to the individual and will contain a breakdown of the clinical findings. In addition, it will indicate any areas of concern which would justify further medical consultation by the individual's personal physician. In the event that the areas of concern are of a severe nature, a follow-up notification will be made to the individual by the medical consultant to answer any questions the employee may have.

4.3.1 Dosimetry/Personnel Monitoring

All project personnel shall participate in a dosimetry program administered by the Project Health Physics Personnel. (The dosimetry program shall comply with 32 IAC 340[1], i.e. dosimeters shall be processed by a dosimetry processor accredited by the National Voluntary Laboratory Accreditation Program.) The Project Health Physics Personnel shall maintain records of all radiation exposures incurred by field personnel including all contractors. These records will be maintained in an up-to-date manner to comply with the requirements of 32 IAC 340.4010. The HSC shall review the results of personal exposure monitoring to determine compliance with exposure limit requirements.

4.3.2 Requirement for Dosimetry

Personal dosimetry is required for anyone who enters a radiologically controlled area in which he/she may receive in one calendar year a dose in excess of 10% of the limits in 32 IAC 340. Any person who works in a radiation area will be required to have a personal dosimeter. As a matter of policy, all individuals shall be required to use a dosimeter (either self-reading type, film badge or Thermoluminescence Detector (TLD)) whenever they enter the Exclusion Zone.

4.3.3 Bioassay

Bioassay is the determination of the types and amounts of radioactive materials which are inside the body. By analyzing the rate of deposition, the rate of excretion, and any other available information regarding placement in the body, internal exposures from radioactive materials can be estimated.

Procedures for bioassay will be consistent with the previous Lindsay Light Health and Safety Plan. Bioassays are not anticipated to be required for the excavation and removal activities proposed, based on levels documented as present. The determination of the need for bioassay will be based on dosimetry monitoring and review and recommendations fromthe Project Health Physics personnel.

[1] The IDNS regulations are usually more restrictive than US Nuclear Regulatory Commission (NRC) regulations. However, if there is a conflict between IDNS and NRC regulations, the NRC regulations will be used to determine compliance.

4.3.4 Emergency Medical Treatment

Emergency first aid should be administered on-site as appropriate. The individual should be decontaminated if possible, depending on the severity of the injury, and transported to the nearest medical facility, if needed. Treatment of the injury is of primary concern and decontamination a secondary concern. Levels of radioactive contamination at the Site could be acutely hazardous if decontamination is not undertaken during an emergency situation. The Field Team Leader will complete the appropriate incident report, if warranted. See Section 4.4, Accident and Incident Reporting.

An emergency first-aid station will be established and will include a first-aid kit for on-site emergency first aid.

Provisions for emergency medical treatment shall be integrated with the following guidelines:

- At least one individual qualified to render first aid and Cardiopulmonary Resuscitation (CPR) will be assigned to each shift.
- Emergency first aid stations in the immediate work vicinity.
- Conspicuously posted phone numbers and procedures for contacting ambulance services, fire department, police, and medical facilities.
- Maps and directions to medical facilities.
- Conspicuously posted evacuation routes and gathering area locations shall be posted around the Site.

4.4 ACCIDENT AND INCIDENT REPORTING

All accidents, injuries, or incidents will be reported to the HSC. This accident/incident will be reported as soon as possible to the employee's supervisor. An Accident/Incident Form will be completed by the Field Team Leader, and a copy will be forwarded to the Project Manager. A copy of the form is shown as Figure 4.1.

Figure 4.1

Accident/Exposure Investigation Report (Page 1 of 3)

Accident/Exposure Investigation Report

Company Date

Investigation Team

Employee's Name & ID

Sex Age Job Description

Department & Location

Accident Date & Time

Date & Time Accident Reported to Supervisor

Nature of Incident

Nature of Injury

Referred to Medical Facility/Doctor Yes No

Employee Returned to Work Yes Date/Time No

Injured Employee Interview/Statement—Attached

Witnesses

Witnesses Interviews/Statements—Attached

Photographs of Site—Attached

Diagrams of Site—Attached

Equipment Records—Attached—Reviewed Yes No

Accident/Exposure Incident Description

Make additional copies of this form as needed. (form provided courtesy of Safety Publications of California © 1990)

Figure 4.1

Accident/Exposure Investigation Report (Page 2 of 3)

Accident/Exposure Investigation Report

Accident Description

Date & Time **Location**

Employees Involved

Preventive Action Recommendations

Corrective Actions Completed	Manager Responsible	Date Completed

—Employee Lost Time—Temporary Help—Cleanup—Repair—Discussion—

Accident Cost Analysis	Investigation	Compliance	Total Cost
Medical			
Production Loss			

Report Prepared By **Date Completed**

Safety Committee Review **Yes** **No**

Corrective Action **Date Started**

Safety Communication Notice Prepared **Date**

Safety Director Signature

Make additional copies of this form as needed. (form provided courtesy of Safety Publications of California © 1990)

Figure 4.1

Accident/Exposure Investigation Report (Page 3 of 3)

Accident/Exposure Investigation Report

Accident Description

Date & Time **Location**

Employees Involved

Employee Interview/Statement—Injured Employee—Witness

Employee Name

Interviewed By

Accident Diagram/Photographs

Make additional copies of this form as needed. (form provided courtesy of Safety Publications of California © 1990)

5. TRAINING

All Site personnel shall be trained and certified in accordance with 29 CFR 1910.120.

5.1 PROJECT- AND SITE-SPECIFIC TRAINING

Prior to project start-up, all assigned personnel shall receive an initial project- and site-specific training session. This training shall include, but not be limited to, the following areas:

- Review of the Health and Safety Plan;
- Review of applicable radiological and physical hazards;
- PPE levels to be used by Site personnel;
- Site security control;
- Emergency response and evacuation procedures;
- Project communication;
- Required decontamination procedures;
- Prohibited on-site activities;
- Instructions to workers in accordance with 10 CFR 1912; and
- U.S. NRC Regulatory Guide 8.13 and Declared Pregnant Woman Policies (Females).

5.2 VISITOR ORIENTATION

All non-essential personnel and visitors who plan to enter the exclusion zone will be briefed on the HASP requirements and 10 CFR 1912 requirements prior to entry with a trained Site escort. In addition, female visitors will be instructed regarding U.S. NRC Regulatory Guide 8.13 and Declared Pregnant Woman Policies.

5.3 SAFETY "TAILGATE" MEETINGS

Before the start of work each day, the Field Team Leader will assemble the Site personnel for a brief safety meeting. The purpose of these meetings will be to discuss project status, problem areas, conditions, safety concerns, PPE levels and to reiterate HASP requirements. The Field Team Leader will complete a Safety Meeting Report (Figure 5.1) to indicate the contents of the meeting and the attendees.

5.4 FIRST AID

At least one (1) individual, trained and qualified to administer first aid and CPR in accordance with American Red Cross requirements, will be present at the Site.

5.5 SAFE WORK PERMIT

Site workers in special work conditions such as confined space, hot work, trenching, or other physical hazards, must be skilled at such work and trained to recognize these as special work conditions. Confined space is defined by OSHA 1910.146. Section 13 of this HASP contains further information on the confined space program to be followed.

Figure 5.2 shows the Safe Work Permit to be completed by the HSC and signed by workers for special work conditions.

Figure 5.1

Safety Meeting Report (KM-4438-A, front side)

SAFETY MEETING REPORT KM-4438-A

DATE			
DIVISION	DEPARTMENT/PLANT		DURATION OF MEETING ☐ A.M. ☐ P.M. TO ☐ A.M. ☐ P.M.
NUMBER PRESENT	NUMBER ABSENT	MEETING CONDUCTED BY	DID MEETING INCLUDE REQUIRED TRAINING? ☐ YES (DESCRIBE BELOW*) ☐ NO

* SUPERVISOR'S PRESENTATION	DISCUSSION OF SAFE/UNSAFE WORK PRACTICES, MATERIALS, JOB PRECAUTIONS, HAZARDS, EQUIPMENT FAMILIARIZATION, ETC.
EMPLOYEE FEEDBACK	COMMENTS, QUESTIONS, COMPLAINTS, ETC.
SUPERVISOR'S CORRECTIVE ACTION PLAN	KNOWN PLANS FOR CORRECTION, PARTS ON ORDER, ITEMS TO BE DISCUSSED WITH DEPT. HEAD, AND CORRECTION OF ITEMS PREVIOUSLY SUBMITTED
DEPARTMENT HEAD COMMENTS	RESOLUTION OF QUESTIONS, ITEMS OR ISSUES RAISED IN MEETING OR WITH SUPERVISOR

SUPERVISOR	DEPARTMENT HEAD
FACILITY MANAGER	Have employees attending sign on reverse side. Forward a copy to the local Safety Department.

Figure 5.1

Safety Meeting Report (KM-4438-A, reverse side)

TO BE SIGNED BY ALL EMPLOYEES ATTENDING MEETING

I have received and understand the information and/or training indicated on the reverse side.

SIGNATURE	DATE	SIGNATURE	DATE

LIST ALL EMPLOYEES ABSENT FROM MEETING

Figure 5.2

Safe Work Permit (KM-2565-1-B, upper section of front side)

SAFE WORK PERMIT KM-2565-1-B

SHADED AREAS MUST BE COMPLETED.

COMPLETED PERMIT MUST BE POSTED AT THE ENTRY OR WORK SITE.

PLANT/DEPARTMENT	ISSUED BY	DATE	TIME (FROM) ☐ A.M. ☐ P.M.	(TO) ☐ A.M. ☐ P.M.
ACCEPTED BY		COMPANY/DEPARTMENT/CONTRACTOR		
RESPONSIBILITY TRANSFERRED TO (NAME)		CO-SIGNATURE (IF REQUIRED)		
LIST ALL WORKERS OR ATTACH ROSTER (OVER)		IS WORK AREA OSHA PSM REGULATED? ☐ Yes ☐ No		

AN ALERT, GAS RELEASE, EVACUATION, INTERRUPTION OF 8 HOURS OR MORE OR CHANGE IN WORKING CONDITIONS SUSPENDS THIS PERMIT.
(Permit must be reissued or reauthorized)

SECTION 1 — GENERAL AREA WORK PERMIT

1. WORK LIMITED TO THE FOLLOWING: (DESCRIPTION & AREA/EQUIPMENT)

2. ON-SITE INSPECTION CONDUCTED/ALL LOCKS OR TAGS ATTACHED, IF REQUIRED/ENVIRONMENTAL IMPACT OF JOB CONSIDERED — PERMIT ISSUER INITIALS — PERMIT RECEIVER INITIALS

3. SPECIAL HAZARDS TO PROTECT AGAINST ☐ NONE MSDS AVAILABLE ☐ YES ☐ NO ☐ N/A

CHEMICALS (NAME)

						ENERGY TYPE(S)
☐ Flammable	☐ Noise	☐ Hot Water/Steam	☐ Thermal Burn	☐ Falls	☐ Pinch Pts./Srp. Edges	☐ Electrical ______ vo
☐ Toxic	☐ Corrosive	☐ Heat Stress	☐ Elect./High Vltg. Line	☐ Asbestos	☐ Other ______	☐ Hydraulic/Pneumatic ______ p
☐ Skin Contact	☐ Reactive	☐ High Pressure	☐ Inert Atmosphere	☐ Radiation	______	☐ Other (magnitude) ______

4. SAFETY EQUIPMENT (OTHER THAN AREA REQUIREMENTS) ☐ NONE

☐ Rain Suit	☐ Gloves	☐ Face Shield	☐ Ground Fault Circuit Int.	☐ Air Pack (SCBA)	☐ Fire Resistant Cloth
☐ Chemical Suit	☐ Hearing Protection	☐ Hood	☐ Barricades/Warning Signs	☐ Supplied Air	☐ Long Sleeves
☐ Rubber Boots	☐ Chemical Goggles	☐ Fall Restraint Device	☐ Communications Eqpt.(list)	☐ Respirator	☐ Other ______

5. *THE PERSON RECEIVING THE PERMIT VERIFIES THAT ALL WORKERS :*

A. Have been through the Plant Safety Orientation	☐ Yes	F. Know emergency alarms, evacuation, assembly points	☐ Yes
B. Understand Applicable HAZCOM requirements	☐ Yes	G. Know the Procedures for Safe Job Completion	☐ Yes
C. Have discussed hazards of the job and area	☐ Yes	H. Have inspected all tools/equipment/scaffolding	☐ Yes
D. Know the location/use of safety showers/eye wash stations	☐ Yes	I. Understand the Housekeeping Requirements	☐ Yes
E. Know the location of the phone or intercom	☐ Yes	PERMIT RECEIVER INITIALS	

6. POTENTIALLY AFFECTED AREA PERSONNEL AND WORKERS NOTIFIED OF WORK TO BE DONE ☐ YES ☐ N/A

7. THE FOLLOWING RESPONSIBILITIES HAVE BEEN COMMUNICATED TO THE PERSON RECEIVING THIS PERMIT:
☐ *Conditions For Work Stoppage* ☐ *Performing The Work Safely* ☐ *Completion Of Section 8 And Permit Return*
☐ *Crew Accountability* ☐ *Reporting Changes That Affect Job Safety*

SECTION 2 — AIR TESTS

PRIOR TO ENTRY OR HOT WORK — ☐ DOES NOT APPLY

TEST IN ORDER INDICATED

Test		Reading	Range	Tested by	Location of test	Time
1. Oxygen meter test performed	☐ Yes ☐ N/A	READING %O_2	RANGE 19.5-23.5% O_2	TESTED BY	LOCATION OF TEST	TIME ☐ A.M. ☐ P.M.
2. Combustible gases and vapors test	☐ Yes ☐ N/A	READING % LEL	MAXIMUM 10% LEL	TESTED BY	LOCATION OF TEST	TIME ☐ A.M. ☐ P.M.
3. Tests for toxics (Substance)	☐ Yes ☐ N/A	READING ☐ PPM ☐ mg/M^3	PEL/TLV ☐ PPM ☐ mg/M^3	TESTED BY	LOCATION OF TEST	TIME ☐ A.M. ☐ P.M.

SECTION 3 — OBSERVATION & RESCUE

☐ DOES NOT APPLY

1 ☐ Yes ☐ N/A	*Continuous monitoring for* ______ (SUBSTANCE)	TESTED BY	TIME (FROM) ☐ A.M. ☐ P.M.	TIME (TO) ☐ A.M. ☐ P.M.	
☐ Yes ☐ N/A	Periodic tests for ______ (SUBSTANCE)	TESTED BY	TIME (FROM) ☐ A.M. ☐ P.M.	TIME (TO) ☐ A.M. ☐ P.M.	
☐ Duration of work ☐ Personal	☐ Area ☐ Other ______				
2. ☐ Yes ☐ N/A	Fire/safety/confined space attendants	DESIGNATED PERSON(S)		HOW TO CONTACT	
3. ☐ Yes ☐ N/A	Backup rescuer(s)	DESIGNATED PERSON(S)		HOW TO CONTACT	
4 ☐ Yes ☐ N/A	*Special rescue service/ equipment required*	LOCATION OF SPECIAL EQUIPMENT		RESCUE SERVICE PHONE NUMBER	

Figure 5.2

Safe Work Permit (KM-2565-1-B, lower section of front side)

SECTION 4	HOT WORK*	☐ DOES NOT APPLY		YES	N/A		YES	N/A
			1. Fire Extinguisher (Type)________ Is it full?			8. Ground lead attached to work		
			2. Survey area for combustibles and openings, holes, trenches etc			9. Prevention of heat exposure to gasket, seals, liners		
			3. Combustible materials removed or protected			10. Other work in area which should be stopped		
			4. Heat/spark control - tarps, covers, water, etc.			11. Material present which emits vapor when heated		
			5. Precaution taken for hidden combustibles			12. Radiant heat transfer considered		
			6. Purge gas used. Type ________			13. Equipment operating or contains original contents		
			7. Adjacent areas safe/sewers protected			14. Ducts or conveyors plugged or protected		

SECTION 5	ENERGY LOCKED/ TAGGED	☐ DOES NOT APPLY		YES	NO	N/A		YES	NO	N/A
			1. Line positively identified				9. Are all automatic valves secured in a safe position?			
			2. Line/equip. drained/depressured, piping properly supported				10. Electrical panel switches locked, tagged and tested			
			3. Line/equipment cleaned and purged				11. Field switches tested			
			4. Blinds and/or block and bleed in place				12. Fuses removed/switches open			
			5. Lock(s) required (list lockout points)				13. Are belts/couplings removed?			
			6. Splash guards considered				14. Are rotating parts blocked?			
			7. Adjacent area safe. (If limited, describe below)				COMMENTS			
			8. Area roped/taped off							

SECTION 6	CONFINED SPACE	☐ DOES NOT APPLY		YES	NO	N/A		YES	NO	N/A
			1. Confined space entry required?				5. Have authorized entrants signed opposite side of this form?			
			2. Space to be entered________				6. Have designated attendants signed opposite side of this form?			
			3. Purpose of entry________							
			4. Is space a permit-entry space? If "YES", complete opposite column				7. Have all necessary hazard control measures been taken?			
							8. Has all required equipment been provided?			

SECTION 7	TRENCHING/ EXCAVATION	☐ DOES NOT APPLY		YES	NO	N/A		YES	NO	N/A
			1. Has the area been inspected for underground power lines or product lines?				4. Have precautions been taken if the trench/excavation develops into a confined space?			
			2. Does the trench require shoring/bracing/ support?				5. Have overhead power/product lines been removed or identified?			
			3. Has the soil been evaluated for stability?				6. Will leaking water or rain water affect the stability of the trench/excavation?			

SECTION 8	Questions to be Completed on Permit Expiration or Job Completion		YES	NO	N/A		YES	NO	N/A
		1. Has the job been completed?				5. Have safety devices been reinstalled?			
		2. Has the area been cleaned of work material?				6. Has hot work area been surveyed for smoldering materials?			
	WORKER CLOSEOUT SIGNATURE	3. Have department personnel been informed job is done?				7. Special precautions, concerns or remarks?			
	TIME ☐ A.M. ☐ P.M.	4. Have all locks and/or tags been removed?				COMMENTS			

Figure 5.2

Safe Work Permit (KM-2565-1-B, reduction of reverse side)

OBSERVERS, WATCHERS, RESCUERS

I have been instructed as a confined space attendant, fire-safety watcher or backup rescuer and understand my duties.

SIGNATURE	DATE	SIGNATURE	DATE

PERSONS AUTHORIZED TO PERFORM WORK AND/OR TO ENTER CONFINED SPACE

I have been instructed in and am aware of the possible hazards and conditions I may encounter in this entry work.

SIGNATURE	TIME IN	TIME OUT	DATE	SIGNATURE	TIME IN	TIME OUT	DATE

COMMENTS

AUDIT PURPOSE ONLY

NAME OF AUDITOR	TITLE	DEPARTMENT	DATE

SECTION OF PERMIT BEING AUDITED

CONCERNS.

CORRECTIVE ACTIONS

COMPLETED BY

NAME	TITLE	DEPARTMENT	DATE	COMMENTS

6. COMMUNICATIONS

6.1 GENERAL COMMUNICATIONS

The Field Team Leader will have available at the Site the means for telephone communications, or an equivalent means of communication, for summoning emergency assistance from the fire/ambulance and police departments in the event they are required. The telephone will also act as a direct link to technical personnel for information pertaining to all phases of the project.

6.2 RADIOS/TELEPHONES

Short-range walkie talkies or cellular telephones will be made available to designated personnel working at the Site.

6.3 EMERGENCY WARNING

In the event of an emergency condition, the Field Team Leader will notify project personnel verbally if all are within immediate hearing and via a bull horn if the Site area is large. The Field Team Leader will also notify visitors present within the area. Site personnel will immediately proceed to a predesignated assembly area as designated by the Field Team Leader during the daily safety meeting. Personnel will remain in the designated area until further instructions are received by the Field Team Leader.

All communication equipment will be tested at the beginning of each day to verify operational integrity.

6.4 HAND SIGNALS

Hand signals will be used by field teams in conjunction with the buddy system. Hand signals shall be familiar to the entire field team before operations commence and should be reviewed during site-specific training.

Signal	Meaning
Hand gripping throat	Out of air; can't breathe
Grip partner's wrist	Leave area immediately; no debate
Hands on top of head	Need assistance
Thumbs up	OK; I'm all right; I understand
Thumbs down	No; negative

6.5 SITE SECURITY

Only authorized personnel will be permitted on the Site in accordance with the requirements of the Site Security Plan (Appendix E to the Removal Action Work Plan) and this HASP. Visitors and other non-essential personnel may enter the work area only upon authorization by the Field Team Leader. This restricted access will ensure that the Field Team Leader can communicate with each person authorized to enter the work area.

7. PERSONNEL EXPOSURE AND AIR QUALITY MONITORING

7.1 AIR QUALITY (DUST)

Due to the nature of the principal contaminants associated with the project, dust suppression will be important as a means of minimizing exposure levels and off-site migration of contaminants. The Field Team Leader will routinely monitor the project area. The OSHA personal exposure limit (PEL) for nuisance dust is 15 mg/m^3.

7.2 AIRBORNE RADIOACTIVITY MONITORING

Monitoring for airborne radioactivity exposure is as important as monitoring for external radiation exposure. Monitoring for airborne radioactivity exposure requires the following elements:

- Air sampling for radioactive particulates,
- Recordkeeping regarding personnel work locations and time in location, and
- Respiratory protective equipment records regarding devices used by workers in airborne radioactivity areas.

By closely monitoring these three elements, a continuous record of personnel exposure to airborne radioactivity is maintained.

Lapel samplers worn for personal air monitoring can be utilized for airborne radioactivity monitoring. Air filters shall be analyzed on a daily basis to determine potential contributions to dose from radionuclides. It is expected that naturally occurring radon and thorium daughters will interfere with analyses. Additional evaluation of samples shall be performed when determined necessary based upon elevated results. Such analyses shall be performed after allowing time for decay of some interfering radionuclides.

Downwind monitoring of the excavation areas for radioactive particulate activity also will be performed. High volume air samplers shall run continuously during operations and be evaluated on a daily basis for gross alpha activity. Comparisons will be made to 32 IAC 340 Appendix A to ensure that adequate radiological controls are in place for workers and the general public. As low as reasonably achievable (ALARA) concepts will be utilized when considering protective measures to ensure that internal exposures are minimized, while also considering the effects of such protective measures with respect to external exposures. Controls on the Site such as wetting of soils and procedural changes, will be employed prior to the prescription of respiratory protective equipment.

Time decay of interfering nuclides generally refers to radon-222 decay and daughters but may also include thoron decay. The specific times for decay of samples is best addressed in procedures rather than in the health and safety plan. Air samples will be decayed a minimum of 5 hours to allow for counting without interference from radon-222 and its daughters. Thoron (Rn-220), if present in significant amounts, will require decay for up to 4 days to allow for decay of it is Pb-212 daughter (10.6 hour half life).

After filters have been collected and decayed overnight, there will be a morning count of the filter that will serve to identify high gross counts for the previous day. This will alert health & safety staff of a potential problem which they can investigate more promptly. The count, after 4 days decay, will serve to be the official measurement of Th-Alpha.

7.3 INTERNAL MONITORING

Internal monitoring to determine intakes of radioactive material will be performed as needed based upon the results of the air sampling program. Bioassay methods to be considered should include in-vivo, as well as in-vitro, assessments. Routine bioassay of workers is not anticipated based upon the low concentrations of radioactivity in soils to be excavated.

7.4 EXTERNAL RADIATION MONITORING

External radiation monitoring of workers will be performed using film badges or thermoluminescent dosimeters. Dosimetry will be provided and processed by a service holding National Voluntary Laboratory Accreditation Program (NVLAP) certification. Pocket dosimeters may also be utilized for visitors and other infrequent personnel requiring access to the Site.

7.5 RADIOLOGICAL SURVEYS

Radiological surveys will be performed to ensure that radiation levels and contamination levels are within regulatory limits for workers and the general public. Radiation surveys will consist of ambient gamma surveys using micro-R meter or Geiger detectors, as appropriate, and contamination surveys. Airborne radioactivity measurements will be performed as described in the Air Monitoring Plan (Appendix B to the Removal Action Work Plan).

7.6 CONTAMINATION MONITORING

Samples shall be obtained periodically in work areas to ensure that radioactivity is present at acceptable levels and is prevented from leaving the Site. Decontamination of elevated areas will be performed to maintain contamination at levels that are ALARA.

Before leaving the exclusion zone, Site personnel shall be checked through use of a hand-held frisker to ensure that contamination is not present on skin or clothes. The Field Team Leader will be immediately informed regarding any contamination on individuals and will initiate appropriate decontamination techniques. Proper disposition of contaminated personal effects and clothing also will be the responsibility of the Field Team Leader.

7.7 TOTAL ORGANIC VAPOR MONITORING

In addition to the radiological contaminants, there is a slight potential of encountering organic vapors. Organic vapors were encountered near the water table during previous investigation at the Site. Routine screening for total organic vapors will be conducted with a photoionization detector (PID), or similar type equipment, on a daily basis. The screening will evaluate ambient photoionization volatile organic vapors and some semi-volatile organic vapors.

Total organic vapors in ambient air will be obtained periodically with a PID during daily field activities. The PID provides real-time readings of exposure to volatile organics and some semi-volatile organics. Measurements will be made daily, prior to activities, to determine background levels. Monitoring measurements will be taken when:

- operations change,
- work moves to a different portion of the Site, and
- personnel observe contaminated materials.

These screening operations will be used to identify conditions requiring an upgrade to full-face respirators as described in Section 7.8.2.

7.8 ACTION LEVELS

7.8.1 Radiological Action Levels

Radiological action levels for on-site workers will be determined by smear/swipe measurements as well as airborne particulate monitoring for the presence of radioactivity. The Field Team Leader will perform radiological monitoring. The radioactive contamination on the Site is particulate and insoluble in water. Therefore, there will be no fixed contamination on the workers. Action levels as determined by radioactive monitoring can be found in Table 7.1.

To avoid the need for upgrade of personal protection equipment due to airborne contamination, engineering controls such as the use of water to minimize dust levels will be implemented as necessary during excavation and restoration activities.

7.8.2 Organic Vapors Action Levels

River East LLC is taking a conservative approach to organic vapor monitoring at the Site. A PID will be used to monitor for organic vapors. Operations will be discontinued if the PID reads 5 ppm[1] or greater and the area will be evacuated. The Site Health and Safety Officer will retest the area wearing a full-face respirator. Operations will not resume until the PID reads less than 5 ppm, and remains below 5 ppm.

---

[1]PID level obtained for Benzene from NIOSH Pocket Guide to Chemical Hazards.

TABLE 7-1

ACTION LEVELS AS DETERMINED BY RADIOACTIVITY

Note: Personnel shall not be exposed to airborne radioactivity such that their weekly intake exceeds 12 Derived Air Concentration (DAC)-hours without prior approval of the Field Team Leader or designee.

Level of protection may be increased to Level C (full-face air purifying respirator) when airborne monitoring indicates that contamination levels have reached 30% of the DAC. All assessments shall incorporate ALARA principles. Engineering controls shall be used prior to assignment of respiratory protective equipment.

Signs shall be posted at entrances to areas where airborne radioactivity levels exceed, or have the potential to exceed, 25% of the DAC.

Radiation Type	Action Level	Level of Respiratory Protection/Action
a. Contamination on smear samples	60 pCi/100 cm^2 gross alpha[a]	Consider modified Level C (full- face APR) based upon ALARA evaluation.
b. Airborne Radioactivity	30% DAC[b]	Consider Level C (full-face APR) based upon ALARA evaluation. Ensure proper posting. Consider internal monitoring
c. Ambient Gamma (work areas)	5 mrem/hr[c]	Consider procedures for shielding of soils. Ensure proper posting.
d. Ambient Gamma (off-site areas)	2 mrem/hr[d]	Implement immediate controls to reduce dose equivalent rate.

Notes

(a) This is approximately 3 times the unrestricted release criteria in the NRC Regulatory Guide 1.86. If any dry-brushing or otherwise abrasive-type decontamination of the sampled equipment is required, the Action Level shown shall require modified Level C (full-face APR).

(b) Potential Airborne Radioactivity Area as defined in 10 CFR 20. Workers with 1000 DAC-hours per year to date must wear modified Level C (full-face APR) until the end of the calendar year.

(c) The ambient gamma dose equivalent rate action level of 5 mrem/hr stems, from the 10 CFR 20 radiation area definition. If the ambient gamma dose equivalent rate reaches 2 mrem/hr, one or more of the following actions will be implemented: The source may be shielded; the working distance from the source may be increased; or the worker's exposure time may be limited.

(d) The ambient gamma action level for off-site is based upon the 10 CFR 20 requirements to maintain dose equivalent rates in unrestricted areas such that they do not exceed 0.002 rem in any one hour.

8. PERSONAL PROTECTIVE EQUIPMENT

It is anticipated that most excavation activities in designated exclusion zones can be conducted in Level D personal protective equipment (PPE), with a contingency upgrade to Level C, based on the action levels listed in Section 7. Level C will be used when required by Special Work Permits, or when directed by the Field Team Leader.

Level D personal protective clothing and equipment for excavation activities includes:

- Coveralls,
- Hard hat,
- Chemical resistant, OSHA approved safety shoes/boots,
- Cotton or leather gloves,
- Safety glasses, and
- Dust mask (optional).

Level C protective clothing and equipment includes:

- Full-face air-purifying respirator (NIOSH/MSHA approved) fitted with radionuclides/HEPA cartridges and/or organic vapor cartridges, depending on which action levels are exceeded (see Section 7 of this HASP),
- Coveralls,
- Tyvek coveralls - required in areas when splashing by contaminated soils or water is a possibility,
- Cotton or leather gloves,
- Disposable latex inner gloves - required in areas when splashing by contaminated soils or water is a possibility,
- Nitrile outer gloves (taped) - required in areas when splashing by contaminated soils or water is a possibility,
- Chemical-resistant steel toe boots, and
- Hard hat.

10 GENERAL WORK PRECAUTIONS

10.1 GENERAL WORK PRECAUTIONS

The following general work precautions apply to all Site personnel.

- Eating, drinking, chewing gum or tobacco, smoking, or any practice that increases the probability of hand-to-mouth transfer and ingestion of material is prohibited in the work area.

- Hands and face must be thoroughly washed upon leaving the work area. Wash water will be provided at the Site for this purpose.

- Whenever levels of radioactivity warrant, the entire body should be thoroughly washed, as soon as possible, after the protective coveralls and other clothing are removed as part of the decontamination process.

- No facial hair that interferes with a satisfactory fit of the mask-to-face-seal is allowed on personnel required to wear respirators.

- Contact with contaminated or suspected contaminated surfaces should be avoided. Whenever possible, do not walk through puddles, leachate, discolored surfaces, kneel on ground, lean, sit, or place equipment on drums, containers, or the ground.

- Medicine, drugs and alcohol may interfere with or impair judgment and reaction times. Therefore, usage of prescribed drugs must be specifically approved by a qualified physician and made known to the Field Team Leader prior to an individuals' presence on the work-site. Alcoholic beverage intake is strictly prohibited at the Site and prior to work.

- All personnel must be familiar with standard operating procedures and any additional instructions and information contained in the HASP.

- All personnel must adhere to the requirements of the HASP.

- Contact lenses are not permitted when respiratory protection is required or where the possibility of a splash exists.

- Personnel must be cognizant of symptoms for radiological exposure on-site, for heat stress and cold stress, and knowledgeable regarding emergency measures contained in the Emergency Contingency Plan.

- Respirators shall be cleaned and disinfected after each day's use or more often, if necessary.

- Prior to donning, respirators shall be inspected for worn or deteriorated parts. Emergency respirators or self-contained devices will be inspected at least once a month and after each use.

- Each employee shall be familiar with the project's Respiratory Protection Program.

10.2 OPERATIONAL PRECAUTIONS

The following operational precautions must be observed at all times.

- All Site personnel shall be adequately trained and thoroughly briefed on anticipated hazards, equipment to be worn, safety practices to be followed, emergency procedures, and communications.

- All required respiratory protective devices and clothing shall be worn by all personnel going into areas designated for wearing protective equipment.

- All Site personnel shall use the buddy system when wearing respiratory protective equipment. At a minimum, a third person, suitably equipped as a safety backup, is required during extremely hazardous entries.

- During continual operations, on-site workers act as a safety backup to each other. Off-site personnel provide emergency assistance.

- Personnel should practice any unfamiliar operations prior to undertaking the actual procedure.

- Entrance and exit locations shall be designated and emergency escape routes delineated. Warning signals for Site evacuation must be established.

- Personnel and equipment in the contaminated work area should be minimized, consistent with effective Site operations.

- Work areas for various operational activities shall be established.
- Procedures for leaving a contaminated area shall be planned and implemented prior to going on-site. Work areas and decontamination procedures shall be established based on expected Site conditions.
- Frequent and regular inspection of Site operations will be conducted to ensure compliance with the HASP. If any changes in operation occur, the HASP will be modified to reflect those changes.

11. SANITARY FACILITIES

11.1 POTABLE WATER

a. An adequate supply of potable drinking water shall be maintained at all times immediately outside the Site. Drinking water shall meet all federal, state and local health requirements.

b. Drinking water shall be supplied to project personnel via approved dispensing sources.

c. Paper cups shall be permitted for the drinking of potable water supplies.

d. Drinking water dispensers shall be clearly marked and shall, in no way, have the potential for contamination from non-potable supplies.

e. Site personnel must be fully decontaminated prior to approaching the drinking water supply.

11.2 TOILET FACILITIES

a. Adequate toilet facilities shall be provided at the Site.

b. These facilities shall be in the form of portable chemical toilets.

c. Routine servicing and cleaning of the toilets should be established with the selected contractor and shall be in accordance with federal, state, and local health regulations.

d. Site personnel must be fully decontaminated prior to approaching the toilet facilities.

11.3 WASHING AREAS

a. Adequate washing areas shall be provided for personal use within the work area.

b. Washing areas shall be maintained in a sanitary condition and will be provided with adequate supplies of soap, towels for drying, and covered waste receptacles.

c. Washing areas shall be maintained and sanitized daily.

d. No eating, drinking or smoking shall be permitted in the work area. This policy will be strictly enforced by the Field Team Leader.

12. FIRE CONTROL EQUIPMENT

An adequate number of approved portable fire extinguishers (class rated A, B and C) shall be readily available at the Site at all times.

All Site personnel shall be trained in the use of the extinguishers. Extinguishers shall only be used on outbreak stage fires or fires of minor nature. The local fire department shall be contacted in the event of a larger fire and Site evacuation procedures should be commenced in accordance with the procedures described in the Emergency Contingency Plan.

13. CONFINED SPACE PROGRAM

13.1 PURPOSE

In the event that confined space work is a necessity, a Confined Space Program will be implemented. Training in the recognition of confined spaces is a component of the health and safety training program.

The purpose of the Confined Space Program is to establish procedures to protect personnel from this serious hazard in the course of their work; and at a minimum, to comply with 29 CFR OSHA 1910.146. This document assigns responsibilities and sets standards for personnel engaged in activities where confined spaces may be present.

13.2 RESPONSIBILITIES

13.2.1 Health and Safety Coordinator

The Health and Safety Coordinator administers the Confined Space Program. The Health and Safety Coordinator's responsibilities include:

- Review of the HASP for potential confined space hazards and design alternative approaches to accomplish the confined space tasks;
- Coordinating and managing the Confined Space Program in the event one is required;
- Establishing priorities for implementation of the program;
- Assisting with recognition and implementation of the Confined Space Program;
- Advising project management on confined space issues; and
- Communicating the Confined Space Program to personnel by training related to specific Site activities.

13.2.2 Project Manager

The Project Manager directs the application of the Confined Space Program to project work. The Project Manager is responsible for:

- Working with the Health and Safety Coordinator to prepare information describing activities that might be conducted in a confined space area;

- Assuring that all personnel engaged in project activities are familiar with the definition of a confined space;

- Assuring that personnel are familiar with the Confined Space Program, and that project activities are conducted in compliance with the Confined Space Program;

- Assuming the responsibilities of the Field Team Leader if another person is not assigned these responsibilities.

13.2.3 Field Team Leader

The Field Team Leader is responsible for the implementation of the Confined Space Program on-site during field activities. The Field Team Leader is responsible for:

- Overseeing implementation of the Confined Space Program during field operations; and

- Reporting confined space work activity, and any violations of the Confined Space Program, to the Project Manager and the Health and Safety Coordinator.

13.2.4 Personnel

Personnel are responsible for:

- Familiarizing themselves with the Confined Space Program and following it;

- Becoming familiar with the criteria for determining a confined space, and with the monitoring, permitting, and other requirements of the program; and

- Reporting immediately a confined space condition to the Field Team Leader.

13.3 DEFINITION OF A CONFINED SPACE

Confined space means a space that:

1. Is large enough and so configured that an employee can bodily enter and perform assigned work;

2. Has limited or restricted means for entry or exit (such as pits, storage bins, hoppers, crawl spaces, and storm cellar areas); and

3. Is not designed for continuous employee occupancy.

Any workspace meeting all of these criteria is a confined space and the Confined Space Program must be followed.

13.4 CONFINED SPACE ENTRY PROCEDURES

13.4.1 Safety Work Permit Required

All spaces shall be considered permit-required confined spaces until the pre-entry procedures demonstrate otherwise. The Safe Work Permit for entry into a confined space must be completed before work begins; it verifies completion of the items necessary for confined space entry. The Permit will be kept at the Site for the duration of the confined space work. If there is an interruption of work, or the alarm conditions change, a new Permit must be obtained before work begins.

A permit is not required when the space can be maintained for safe entry by 100% fresh air mechanical ventilation. This must be documented and approved by the Health and Safety Coordinator. Mechanical ventilation systems, where applicable, shall be set at 100% fresh air.

The Field Team Leader must certify that all hazards have been eliminated on the Entry Permit. If conditions change, a new permit is required.

13.4.2 Pre-entry Testing for Potential Hazards

a. Surveillance

Personnel first will survey the surrounding area to assure the absence of hazards such as contaminated water, soil, or sediment, barrels, tanks, or piping where vapors may drift into the confined space.

b. Testing

No personnel will enter a confined space if any one of these conditions exists during pre-entry testing. Determinations will be made for the following conditions:

1. Presence of toxic gases or dusts: Equal to or more than 5 parts per million (ppm) on the organic vapor analyzer with an alarm, above background outside the confined space area; or other action levels for specific gases, vapors, or dusts as specified in the Health and Safety Plan and the Confined Space Permit based on knowledge of Site constituents;

2. Presence of explosive/flammable gases: Equal to or greater than 10% of the Lower Explosive Limit (LEL) as measured with a combustible gas indicator or similar instrument (with an alarm); and

3. Oxygen Deficiency: A concentration of oxygen in the atmosphere equal to or less than 19.5% by volume as measured with an oxygen meter.

Pre-entry tests results will be recorded and kept at the Site for the duration of the job by the Field Team Leader. Affected personnel can review the test results.

c. Authorization

Only the Field Team Leader and the Health and Safety Coordinator can authorize any personnel to enter into a confined space. This is reflected on the Safe Work Permit for entry into a confined space. The Field Team Leader must assure that conditions in the confined space meet permit requirements before authorizing entry.

d. Safe Work Permit

An Safe Work permit for confined space entry must be filled out by the Health and Safety Coordinator or Field Team Leader. A copy of the Safe Work Permit is included as Figure 5.2.

e. Attendants

One worker will stand by outside the confined space ready to give assistance in the case of an emergency. Under no circumstances will the standby worker enter the confined space or le[illegible] There shall be at least one other worker not in the c[illegible] or call of the standby worker.

(1) Oxygen
(2) Flammable
(3) OVA

f. Observation and Communic[illegible]

Communications between star[illegible] shall be maintained at all times. Methods of commu[illegible]ified in the Safe Work Permit and the HASP may include voice, voice by powered radio, tapping or rapping codes, signaling tugs on rope, and standby worker's observations that activity appears normal.

13.4.3 Rescue Procedures

Acceptable rescue procedures include entry by a team of rescuers only if the appropriate self-contained breathing apparatus (SCBA) is available; or use of public emergency services.

The standby worker must be trained in first aid, CPR, and respirator use. A first aid kit should be on hand and ready for emergency use. The standby worker must be trained in rescue procedures. Retrieval of an unconscious victim in a confined space will only be conducted by trained rescue personnel. An emergency call to 911 will be initiated to assist the victim.

13.5 TRAINING

Personnel who will engage in field activities will be given annual training on the requirements and responsibilities in the Confined Space Program and on OSHA 1910.146. Only trained personnel can work in confined spaces. Workers should be experienced in the tasks to be performed, instructed in proper use of respirators, lifelines and other equipment, and practice emergency procedures and self-rescue.

Before each Site activity, the determination of confined space work will be part of the Site characterization process. Training in the site-specific confined space activities will be part of the site-specific health and safety training.

13.6 SAFE WORK PRACTICES

- Warning signs should be posted. These include warnings for entry permits, respirator use, prohibition of hot work and emergency procedures and phone numbers.

- Cylinders containing oxygen, acetylene or other fuel such as gasoline must be removed a safe distance from the confined space work area.

- Purging and ventilating is done before work begins to remove hazardous vapors from the space. The space should be monitored to ensure that the gas used to purge the space (e.g. tank) has also been removed. Local exhaust should be used where general exhaust is not practical.

- The buddy system is used at all times. A standby person always must be posted within sight of, or in communication with, the person inside the confined space. The standby should not enter the confined space, but instead will call for help in an emergency and not leave the post. Communication should be maintained at all times with workers inside the confined space.

- Emergency planning in the HASP and an Safe Work Permit must be approved in advance and the proper rescue equipment must be immediately available.

14. ELECTRICAL LOCKOUT/TAGOUT

The Field Team Leader must approve all work in areas requiring lockout/tagout procedures. Specific procedures and permitting requirements will be specified in the HASP, or in a revised HASP based on the need for a worker to work around electrical equipment.

All systems must be locked out and tagged before the work begins. This includes pipes, air lines, electrical equipment and mechanical devices. The equipment must be start tested and approved for use by a worker by the Health and Safety Coordinator or the Field Team Leader by start-testing to make sure the locked-out equipment does not operate.

ATTACHMENT 3

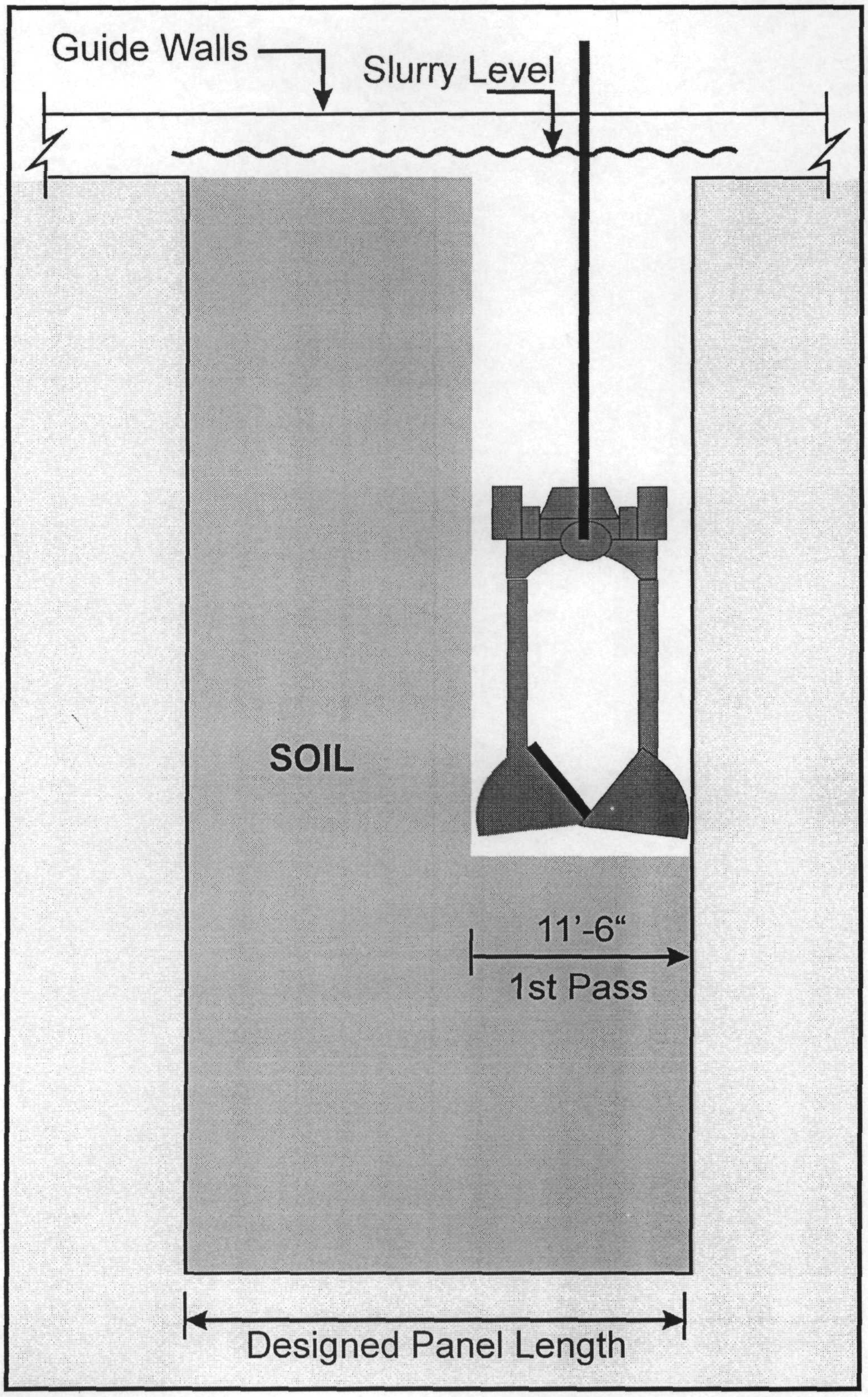
SLURRY WALL CONSTRUCTION METHOD SCHEMATIC

Sequence of Slurry Wall Construction

1. Excavate panel to required depth
2. Recycle/clean slurry in panel
3. Set end-stops (where required)
4. Set prefabricated reinforcing steel cage; anchor to guide walls
5. Place tremie pipes to bottom of panel; connect hoppers to top of pipes
6. Place high slump concrete, discharging directly from ready-mix trucks
7. Pump-off displaced slurry back to holding tanks
8. Remove tremie pipes and extract end-stops
9. Continue excavating and concreting operations on alternating panel basis

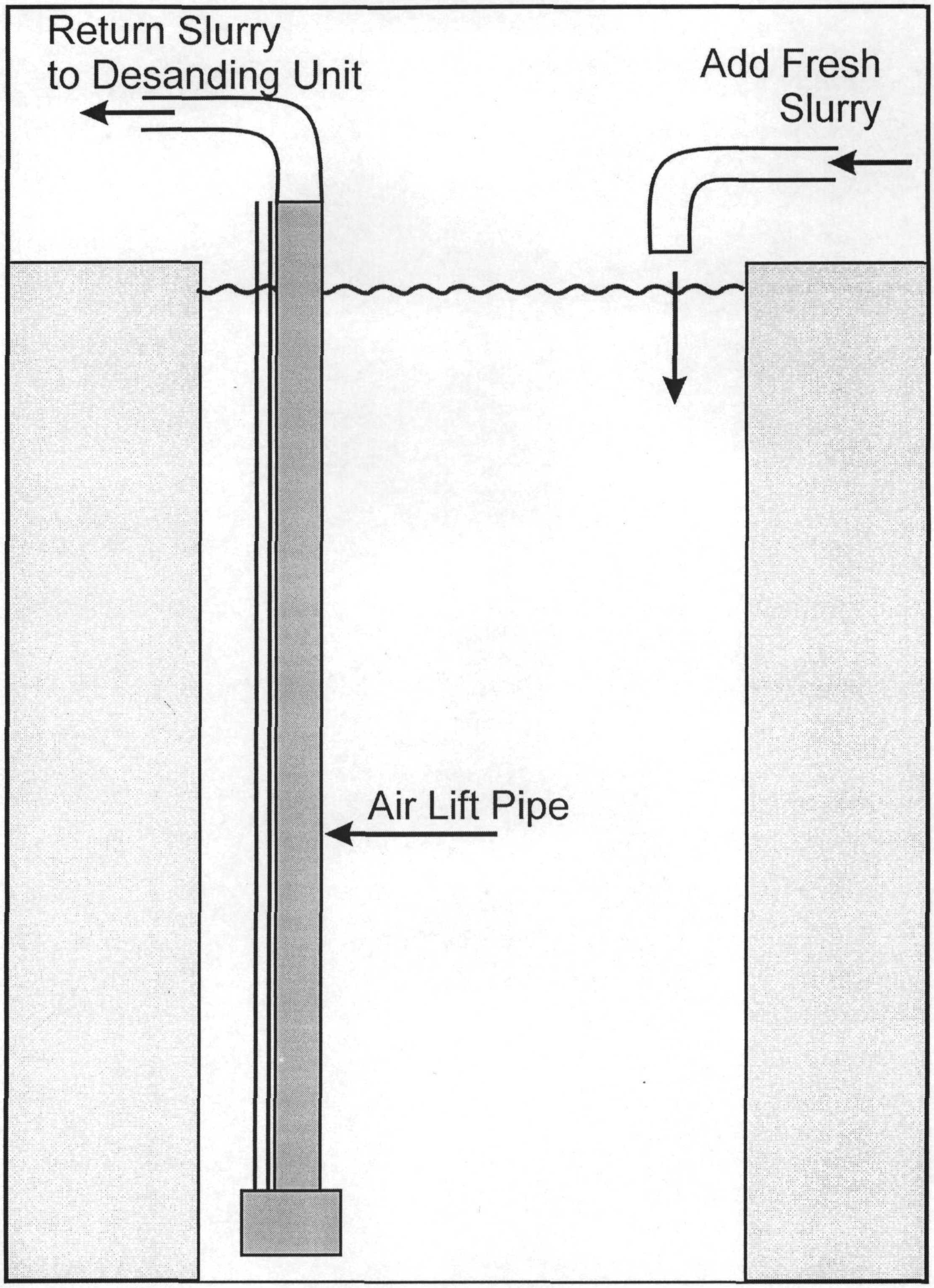
- Concurrent Operations:
  - Construct perimeter guide walls
  - Slurry mixing, distribution and cleaning
  - On-site cage fabrication
  - Inspection activities
  - Off-site spoil disposal

1. Excavation of Panel



CASE FOUNDATION
A Keller Company

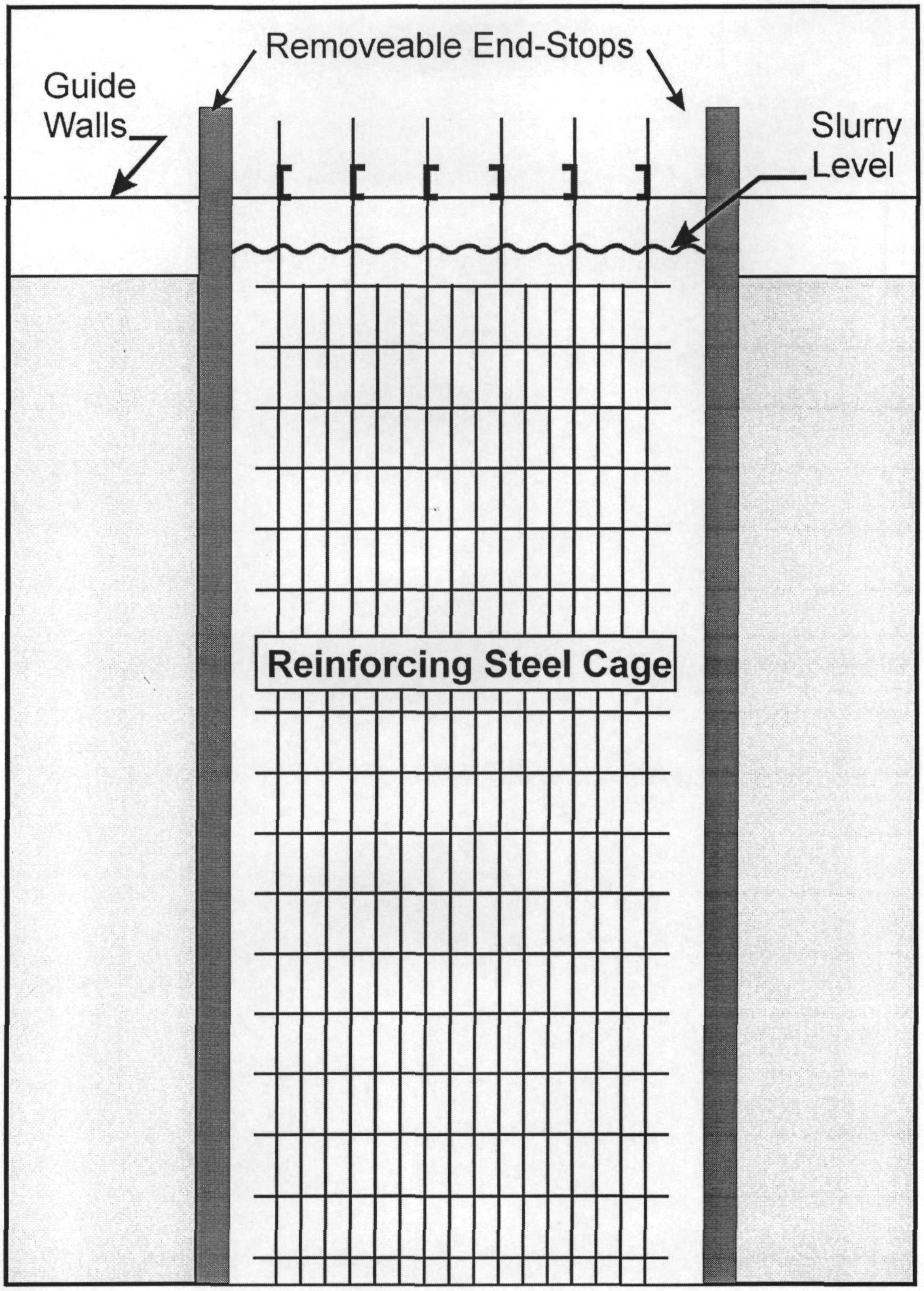
2. Cleaning Slurry After Excavation Is Complete



CASE FOUNDATION
A Keller Company

jacob0698.ppt

3. End-Stops and Reinforcing Steel Cage In-Place



CASE FOUNDATION
A Keller Company

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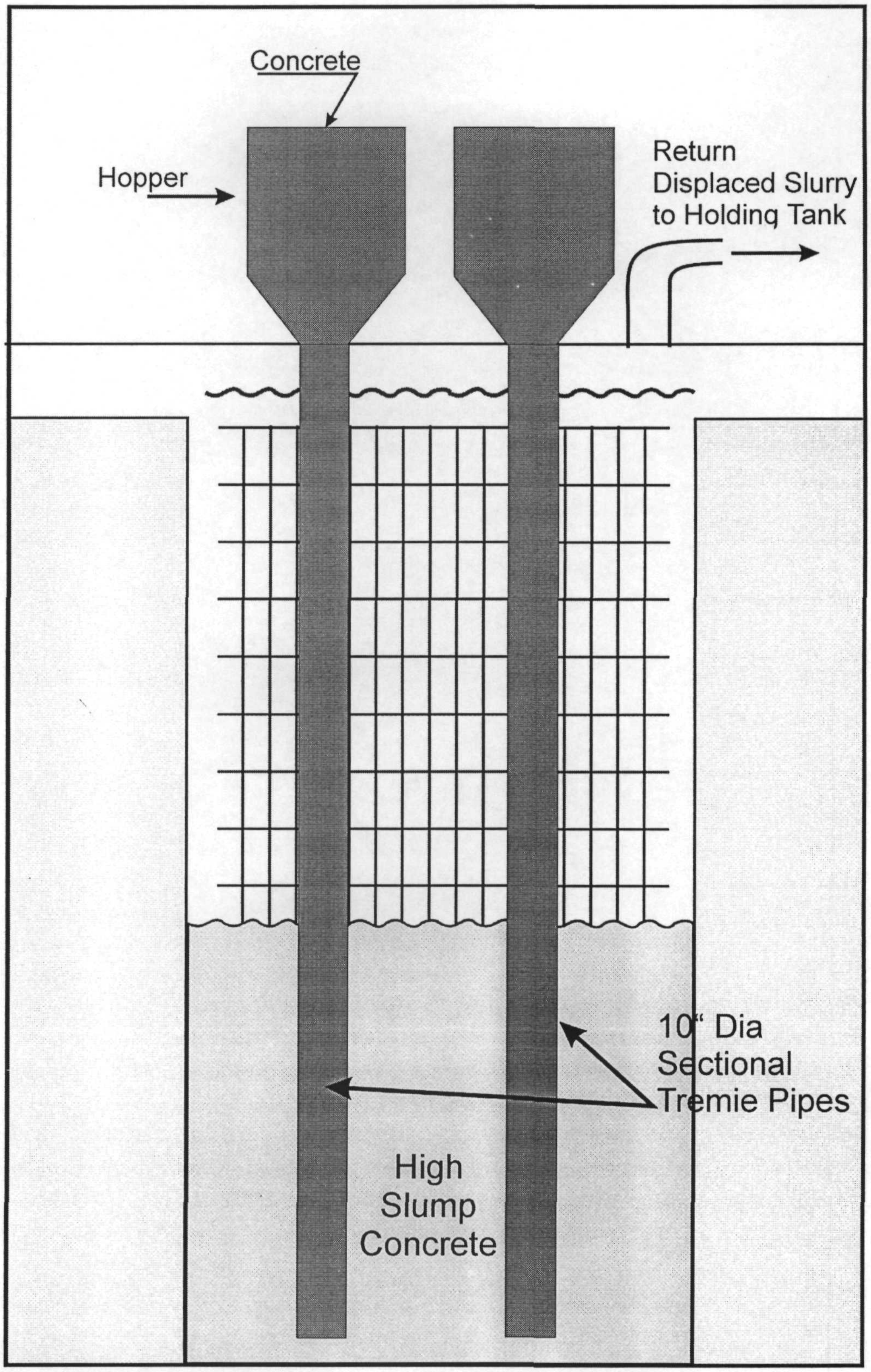
4. Tremie Concrete Placement



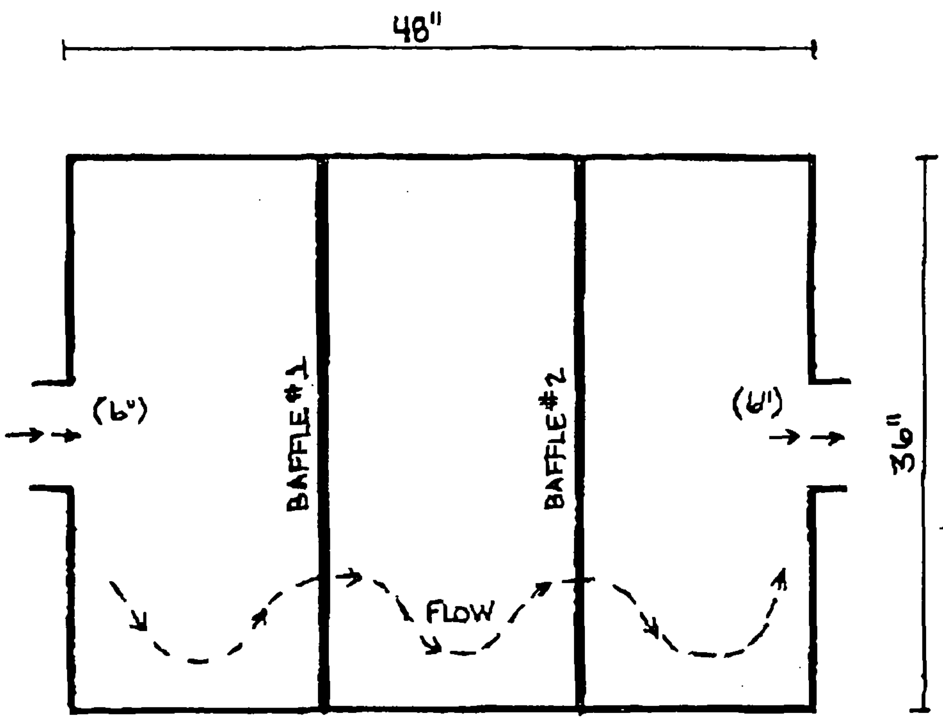
<u>ATTACHMENT 4</u>

DEWATERING SYSTEM SCHEMATIC

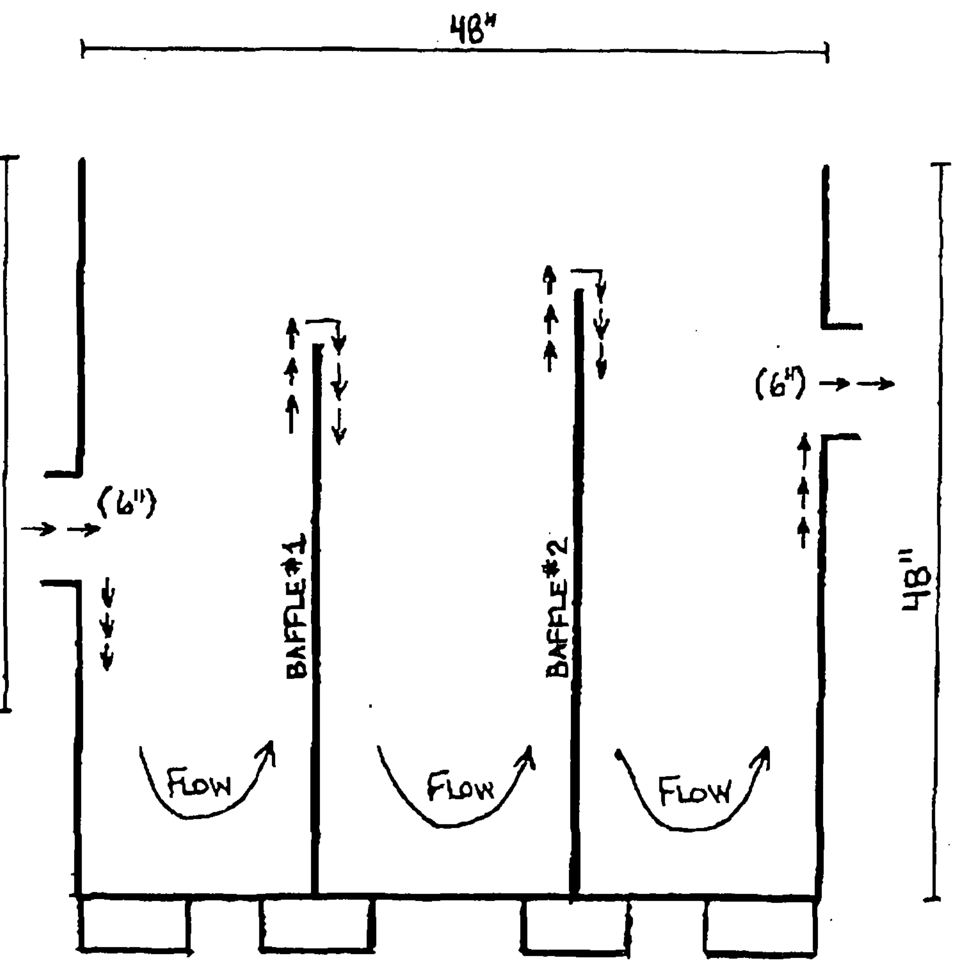
300 GALLON SILT BOX

(WOOD CONSTRUCTION)

MIDWEST DEWATERING COMPANY, INC.
1333 - 125th Street, P.O. Box 850
Hammond, Indiana 46325-0850
219/ 659-0009
FAX: 219/ 659-0027



TOP VIEW



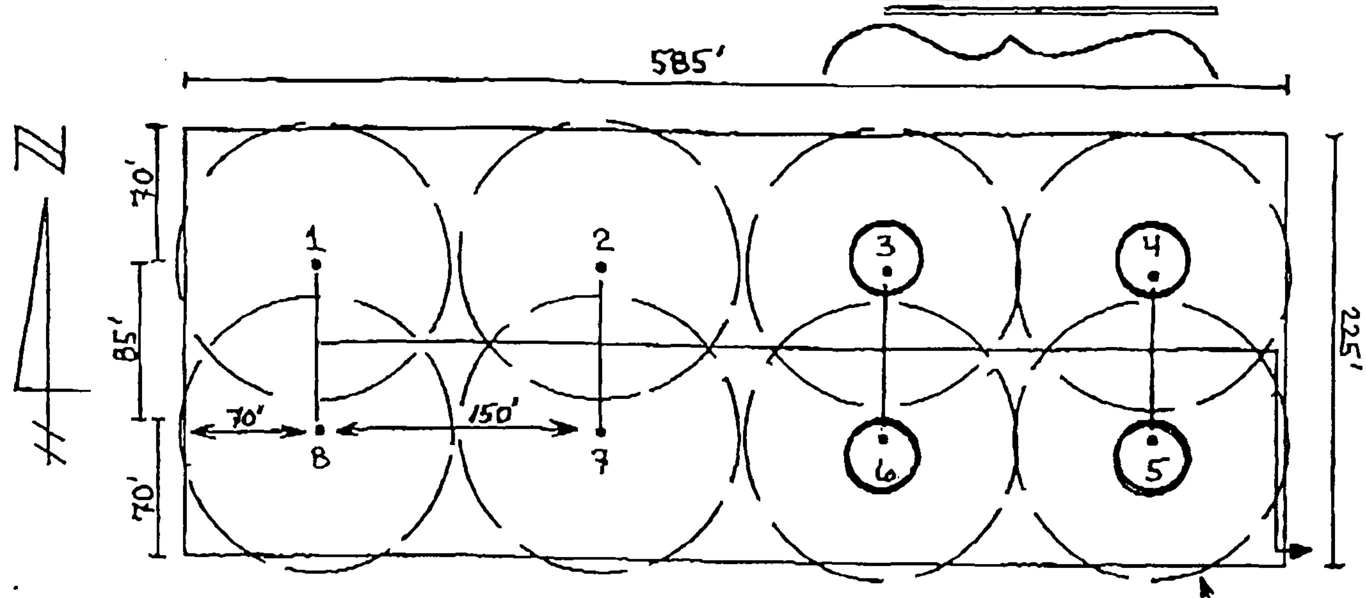
SIDE VIEW

MIDWEST DEWATERING COMPANY, INC
1333 -125th Street, P.O. Box 850
Hammond, Indiana 46325-0805
219/ 659-0009
FAX: 219/ 659-0027

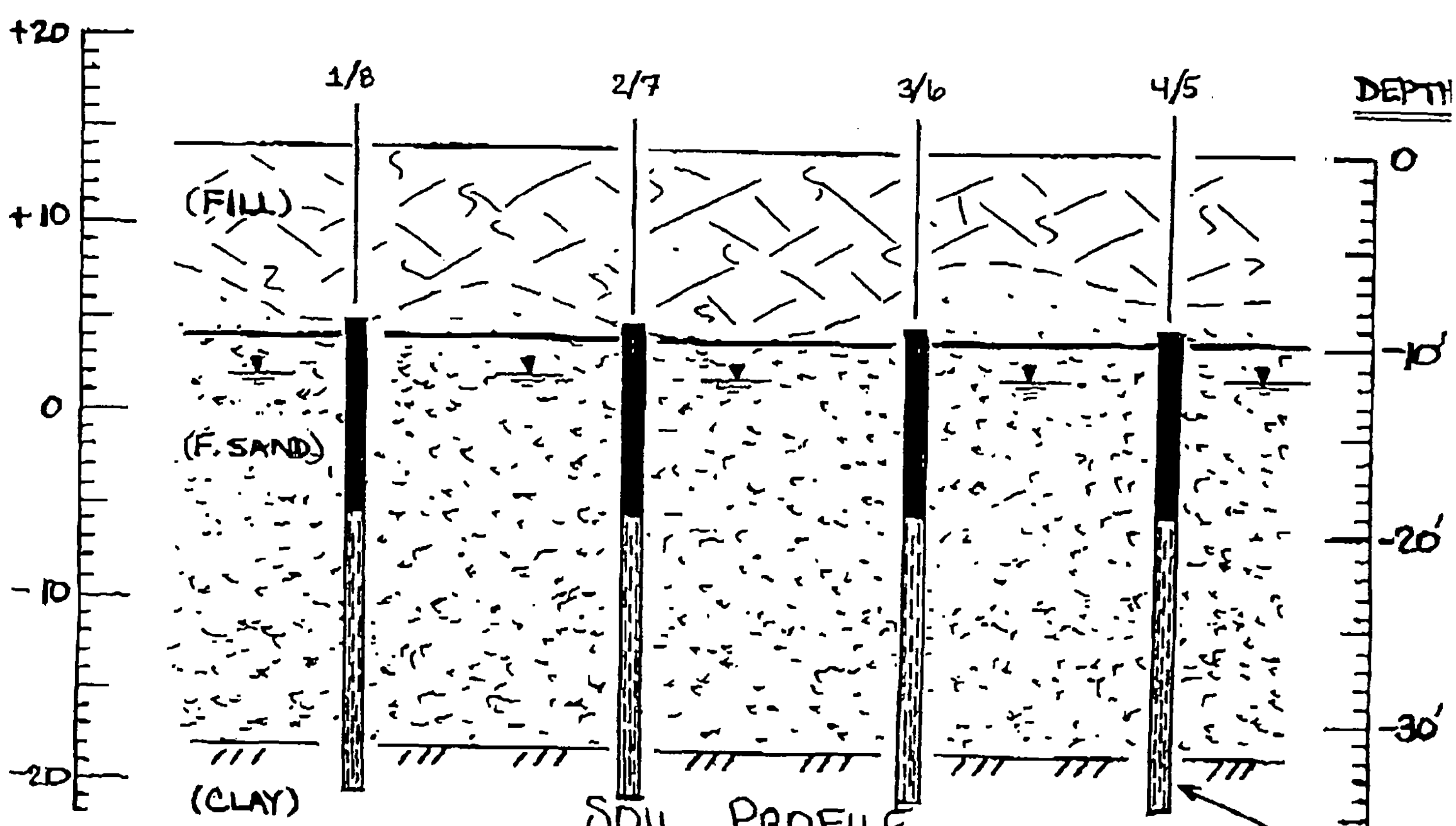
— REVISED —

RIVER EAST CENTER
CHICAGO, IL

4 INITIAL PUMPS



SITE PLAN
(1"=100')



SOIL PROFILE
(TYPICAL)

ATTACHMENT 5

HEALTH PHYSICS SUBCONTRACTOR INFORMATION

RSSI

6312 West Oakton Street
Morton Grove, IL 60053-2723
847-965-1999
Fax 847-965-1991

RSSI BACKGROUND INFORMATION

RSSI provides a wide range of health physics, industrial hygiene and environmental health services to clients throughout industry, business, government, medicine, education and law. Founded in 1976 as Radiation Safety Services, Inc., RSSI has expanded in response to client needs for additional high-quality professional services from a health physics consulting firm into a multi-service company that includes a radiological laboratory as well as industrial hygiene and environmental health services. The quality of its professional services has led to RSSI's providing program management and staffing for two of the Fortune Top 10 companies and for two of the four largest not-for-profit research institutions in the United States. RSSI provides program support to many other organizations including major corporations, not-for-profit research and academic institutions, and governmental agencies. RSSI's professional staff includes Certified Health Physicists, Certified Industrial Hygienists and Registered Professional Engineers.

HEALTH PHYSICS SERVICES

Health physics is dedicated to protecting man and the environment from unnecessary exposure to radiation. RSSI uses established management techniques when working with clients to ensure that they use radioactive materials and other sources of ionizing and non-ionizing radiation in accordance with applicable regulations while eliminating unnecessary program activities. This approach results in maximum regulatory compliance, lower exposure to radiation and reduced costs, thus meeting basic radiation safety goals while saving money.

Auditing Programs RSSI audits radiation safety programs for compliance with state and federal requirements including license conditions. Clients learn what they can do to prevent unnecessary items of noncompliance during inspections while improving the protection of their personnel and the public. They also learn how to simplify their radiation safety programs to make them easier to manage and more cost-effective.

Licensing RSSI works with clients to obtain licenses without unnecessary commitments and complicated monitoring requirements. Clients gain licenses that allow them to create workable radiation safety programs that serve their needs while providing for necessary safeguards.

Managing and Staffing Programs RSSI is the leading source of professionally staffed radiation safety programs in the Midwest. Clients include educational institutions, hospitals and industrial operations. RSSI's manpower ranges from technicians who perform routine activities to Certified Health Physicists who handle complex technical and administrative problems.

Managing Radiological Emergencies RSSI's professionals are available 24 hours a day, seven days a week to provide expert guidance and manpower in emergencies. Emergency response activities have included management of contamination resulting from the inclusion of cobalt-60 in cast iron products from Juarez, Mexico; radium contamination of aluminum; contamination of copper with accelerator produced material, and contamination of factories processing materials with the potential for uptake by humans with polonium-210. RSSI performed electron microscopy analysis of polonium-210 microspheres to determine if a respiration hazard exists. RSSI is licensed to provide emergency response.

Training RSSI trains clients' employees to work safely with radiation hazards. Unnecessary exposure and risk are minimized while complying with regulatory requirements. Training is directed at both the level of hazard and individual requirements based on job description. Training programs can be either general or task oriented.

RADIOLOGICAL LABORATORY

RSSI's radiological laboratory performs alpha and beta analyses, high resolution gamma spectroscopy and other services. RSSI analyzes leak test, bioassay and environmental samples. RSSI also calibrates and repairs survey and counting instruments. RSSI is a secondary laboratory for exposure rates from 0.1 mR/hr to 50 R/hr and provides clients with rapid turnaround. All calibration and analytical services are traceable to the National Institute of Standards and Technology and ANSI and are licensed and approved by regulatory agencies.

RADON SERVICES

Indoor radon is the nation's most serious radiological health hazard. To meet governmental and consumer needs for accurate radon-220 and radon-222 measurements and technical information on mitigation, RSSI added radon services to its health physics capabilities. RSSI was asked to assess radon hazards and risks under a contract funded by the U.S. Environmental Protection Agency. RSSI supplies alpha-track monitors to organizations, governmental agencies and individuals who wish to monitor radon levels in buildings, performs monitoring prior to real estate transactions, and advises local governments and industry in building techniques to reduce radon concentrations in future construction.

INDUSTRIAL HYGIENE SERVICES

Industrial hygiene and occupational health protect the worker on the job from biological, chemical, physical and mechanical hazards. Employers are becoming increasingly aware that protecting workers is an ethical and economic responsibility. At the same time the increasing complexity of workplace hazards calls for ever greater knowledge and skill in developing solutions. RSSI performs industrial hygiene hazard assessments and makes recommendations to ensure compliance with Occupational Safety and Health Act (OSHA) Standards. RSSI emphasizes engineering controls as the best approach to worker protection. The quality and objectivity of RSSI's professional activities have resulted in RSSI being selected as a technical expert by both plaintiffs and defendants in litigation.

Organizing and Administering Industrial Hygiene and Safety Programs RSSI develops specialized programs to focus on specific workplace hazards or a comprehensive program that deals with a wide range of workplace hazards. RSSI has supplied industrial hygiene programs to federal agencies in ten states. These program covered indoor air quality, worker protection, chemical storage, and asbestos, as well as support for specific complaints that occur at individual locations.

Training Training for management personnel emphasizes the need to follow regulations and to protect workers. Worker training expands on the worker's need to protect the health and safety of himself and others if engineering controls fail.

Developing Respiratory Protection Programs When workplace contaminants exceed OSHA-specified levels, respiratory protection programs are required to protect workers from exposure to airborne contaminants. RSSI establishes policy and specifies respirators as well as providing training and qualitative fit-testing for respirator use. RSSI also helps clients meet record-keeping requirements that include proof of being fitted and proof of medical examination.

Writing Specifications for Industrial Hygiene Projects Clients who have the skills to protect employees from everyday operating hazards may still want specialized assistance for major one-time projects such as asbestos abatement. RSSI writes specifications based on current regulations and assists in contractor selection. RSSI also monitors contractor performance for clients to ensure that work is performed in accordance with specifications.

Analyzing Industrial Hygiene Samples Regulated by the Nuclear Regulatory Commission Part 29 CFR 1910 requires monitoring of the work environment for asbestos and other hazardous materials. Timely and accurate analysis is essential to protect workers and satisfy regulatory requirements. At no time is this more important than during decontamination and decommissioning of nuclear power plants when exposure to hazardous materials is probable. Parts 10 CFR 20, 40 and 70 require that regulated material be transferred only to a licensee. This has meant that quality analysis of samples from restricted areas by an AIHA-accredited laboratory was impossible. RSSI is licensed by the NRC to collect and accept industrial hygiene samples from restricted areas. RSSI provides analysis by a licensed, AIHA-accredited laboratory for industrial hygiene samples that may contain source, special nuclear or by-product material. This enables clients to monitor industrial hygiene hazards in licensed facilities as thoroughly as radiological hazards are monitored.

Investigating Accidents RSSI performs detailed accident investigations to determine what occurred, what equipment or materials were involved, what caused the accident and what can be done to prevent recurrence.

Correcting Items of Noncompliance Cited by OSHA RSSI works with clients to correct OSHA items of noncompliance in a cost effective manner.

ENVIRONMENTAL HEALTH SERVICES

Environmental health protects the public and the environment. Health physics, Industrial hygiene and environmental health activities frequently overlap. The on-the-job hazard becomes environmentally important when it is released to the environment and becomes subject to environmental laws such as NESHAPS, TSCA, CERCLA and SARA.

RSSI assesses current hazards and the potential for future exposure to hazards and associated liability. Federal and state laws hold property owners liable for hazards created and released by previous owners as well as by themselves. Examples of RSSI's services in this area include research efforts to discover environmental impairment on property considered for acquisition to reduce or eliminate exposure to future liability. RSSI researches prior land and building use and performs sampling for environmental contaminants.

ADDITIONAL INFORMATION

RSSI's offices and laboratories are at 6312 W. Oakton Street, Morton Grove, IL 60053-2723. If you would like more information about RSSI's services, please call 847-965-1999.

ELI A. PORT
Citizenship: USA
Security Clearance Granted: Secret

CURRICULUM VITAE

Employment:

1976- RSSI, Morton Grove, Illinois.
Founder and President of a health physics, industrial hygiene and environmental consulting firm specializing in regulatory affairs and government liaison, in developing and applying modern, cost-effective management techniques. Managed and staffed institutional radiation safety and industrial hygiene programs including a leading research institutes, major corporations, universities, medical centers and government agencies. Developed laser safety programs. Member, Technical Advisory Committee to the Illinois Department of Nuclear Safety (IDNS) Low Level Radioactive Waste Management Program. Developed combined Radiation Safety Program for licensed activities on a dual use US NRC licensed/US DOE contracted site. Health physics supervisor for decontamination of 27-acre site contaminated with source material. Characterized a 60-acre mixed waste site. Provided technical support for a government intervention on major radioactive and mixed waste National Priority List sites. Developed alternative compliance program accepted by US EPA to demonstrate national compliance with 40 CFR 61, Subpart I. Served on City of Chicago Hazardous Materials Consultants Committee. Designed shielding for clinical facilities and 10 MeV electron beam accelerator. Performed radiological safety evaluations for the world's largest production cyclotron. Designed and assembled nuclear utility and secondary laboratory calibration facilities and developed QC/QA Plan for laboratory accreditation.

1997- Illinois Institute of Technology, Chicago, Illinois.
Research Associate Professor
Co-Direct Master of Health Physics Program combining traditional technical content with courses in law, management and communication. Designed advanced degree program for professionals in government, industry, and universities with courses available via the internet.

	Northwestern University, Evanston, Illinois.
1996-	Team Leader CPD 243, Compliance With Radiation Regulations
1989-	Adjunct Assistant Professor in Environmental Health Engineering.
1983-	Instructor in CPD 240, Radiation Safety. Lectures on detection and measurement, licensing and regulation of radiation hazards.
1976-	Lecturer in 720-C65 Series, Radiological Health.
1973-1976	Director, Center for Radiation Safety. Coordinated a multi-institutional program for two campuses and six affiliated clinical and research hospitals serving 1,000 occupationally exposed employees working with 200 radioisotope labs, four accelerators, a reactor and 150 machine sources of radiation. Responsible for legal and administrative aspects of the program under broad research and medical, special nuclear material, source material, and cobalt teletherapy licenses. Started a comprehensive dosimetry program with a 50 percent cost reduction. Developed a computerized inventory control. Designed and implemented a radioactive waste handling system to effectively eliminate personnel injury and contamination. Started a round-the-clock radiological emergency response program. Instructed M.S. and Ph.D. students in Radiological Health Physics.
1972-1973	St. Francis Hospital, Evanston, Illinois. Medical Physicist and Radiation Safety Officer. Advised the hospital administration on all safety and legal considerations with respect to ionizing and non-ionizing radiation. Provided health physics services for diagnostic X-ray, radiation therapy and nuclear medicine departments, including surveying, environmental monitoring, personnel monitoring and licensing. Calibrated diagnostic and therapeutic X-ray and teletherapy equipment. Planned treatments and performed dosimetry for external, intracavitary, interstitial and systemic radiation therapy. Designed beam blocking system for use during large-field therapy and developed a system for the use of equipment in large-field therapy. Taught radiology residents and X-ray technology students. Advised Safety Committee and hospital administration on the federal Occupational Safety and Health Act.

1969-1972 Packard Instrument Co., Downers Grove, Illinois.
Radiation, Health and Safety Officer.
Responsible for all administrative and operational aspects of health physics program. Started company's OSHA compliance program. Designed and specified safety standards for Packard products used in hospitals and laboratories in a program to minimize product liability exposure. Taught fundamental and advanced courses in handling and use of radioactive materials. Conducted seminars for airlines and fire departments on transportation and handling of hazardous materials and emergency procedures.

1966 CERN, Geneva, Switzerland.
Visiting Scientist.
Evaluated health physics instrumentation for field surveys at 28 GeV Proton Synchrotron. Determined exposures and dose equivalents from data generated by instruments measuring conventional and exotic particle radiation.

1963-1965 Alpha R & D, Dixmoor, Illinois.
Project Director.
BuWeps program in interfacial phenomena of composite glass-resin systems using THO as tracer. Radiation Safety Officer responsible for curie quantities of H-3.

Certification: American Board of Health Physics
American Board of Industrial Hygiene

Registration: Professional Engineer

Education: M.S.: Radiological Health Physics, Northwestern University, 1968.
Thesis Topic - Chemical Radioprotective Properties of Cyclic Choline Xanthate.

B.S.: Physics, Roosevelt University, 1963.

Papers and Publications:

<u>Health Physics Instrumentation at CERN</u>, Internal Report, 1966.

<u>Radioprotective Properties of Cyclic Choline Xanthate</u>, Annual Meeting, Health Physics Society, Denver, Colorado, 1968.

<u>Benefit vs. Risk Criteria in Pediatric Radiography</u>, 2nd International Congress of the International Radiation Protection Association, Brighton, England, 1970.

<u>A Mathematical Model for Establishing the Benefit vs. Risk Criterion on Diagnostic Radiology, Symposium on Population Exposures</u> A, CONF 741018 US AEC/TIC.

<u>An Improved Container for Radioactive Waste in Laboratories and Hospitals</u>, Journal of Chemical Education, April 1975.

<u>An Improved Receptacle for Radioactive Waste</u>, Health Physics, November 1975.

<u>How To Reduce Radioactive Waste Disposal Costs</u>, Industrial Hygiene & Safety, May 1987.

<u>Radon Measurements: Are They Accurate And Precise</u>, The Radon Industry Review, April, 1990.

Michael T. Van Der Karr, C.H.P.

205 S. Hale Street ▪ Addison, Illinois 60101 ▪ mtvdk@mcs.net ▪ (630) 458-1624

Professional Profile

- Consistently take initiative in identifying problems, offering creative solutions, and improving efficiency and quality.
- Customer service oriented, very personable, high energy level, self motivated with ability to quickly learn any subject, high standard of ethics.
- Work effectively independently, without supervision, and as a team member.
- Proven interpersonal and communication skills: teaching, procedure and report writing, listening.
- Excellent computer skills: Win95, DOS, Mac, programming, Fortran, MS Word, Excel, Access, Powerpoint, Internet communication, Web page development, Microshield, Microskyshine, and gamma spectroscopy.
- Plan, develop and coordinate large projects.

Professional Experience

HEALTH PHYSICS CONSULTANT — Jan. 1998 – Present
Radiation Safety Services, Inc. Morton Grove, Illinois
Decontamination and decommissioning. Program audits. Training. Writing reports and procedures. Dose modeling. Manage lab. Automate leak testing services. Representation at NRC enforcement conferences.

RADIOACTIVE MATERIAL MANAGER AND RAD. WASTE GROUP SUPERVISOR — June 1997 – Jan. 1998
Stanford Linear Accelerator Center Stanford, California
Supervised a professional and three technicians. Created database for complete radioactive material tracking across the SLAC Intranet. Developed radioactive material program and operating procedures. Hands on management of facility led to accolades from upper management and Department of Energy personnel.

TECHNOLOGY DIRECTOR, COMPUTER INSTRUCTOR, SYSTEMS ADMINISTRATOR — July 1996 – June 1997
Carmel High School Mundelein, Illinois
Developed technology plan. Installed software, hardware, network, and web servers. Managed $50k budget. Taught faculty and students in MS Office and Internet use. Championed efficient use of resources.

OPERATIONAL HEALTH PHYSICIST AND RADIATION PROTECTION INSTRUCTOR — Jan. 1990 – Dec. 1995
Brookhaven National Laboratory Upton, New York
Developed, administered, and presented the BNL safety training program. Operational field support including surveys and control for radiation fields up to 1000R/hr, neutron fields, high contamination, airborne areas, chemical, and industrial jobs. Supervisor in charge of safety for the Waste Management Group. Characterized and managed the transfer, storage, and disposal of radioactive waste. Formulated, implemented and managed a complete radiation protection program. Instituted controls that stopped the spread of contamination on personal clothing. Oversaw radioactive shipments to ensure federal regulations were followed. Cut background radiation levels by half in waste facility. Provided field coverage & all technician duties.

DESKTOP PUBLISHING SOFTWARE TECHNIQUES CONSULTANT AND DEVELOPER — May 1989 – Jan. 1990
Apple Computer Incorporated Cupertino, California

DESKTOP PUBLISHING COORDINATOR AND MATH TEXTBOOK WRITER & EDITOR — June 1986 – May 1989
Addison-Wesley Publishing Company Menlo Park, California

OTHER PROFESSIONAL ACHIEVEMENTS
16 hour DOT, 40 hour Conduct of Operations Assessment, 40 hour supervisor training, 16 hour Total Quality Management, 24 hour Radiological Assistance Program, 8 hour project coordinator, 16 hour technical writing, 40 hour HAZWOPER, 8 hour Hazmat, 24 hour asbestos sampling, LOTO, 100 hour Performance-Based Training, High Scool Math Teacher, Junior College Algebra Teacher.

Education

MASTER OF SCIENCE IN RADIOLOGICAL HEALTH PHYSICS, May 1993.
San Jose State University San Jose, California

BACHELOR OF SCIENCE IN ENGINEERING PHYSICS, June 1983.
Santa Clara University Santa Clara, California

Certification by American Board of Health Physics (ABHP) in 1994

RSSI

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DAVID R. FERMIN

EDUCATION

Northwestern University, Robert R. McCormick School of Engineering
Bachelor of Science in Biomedical Engineering, December 1998
Concentration: Biotechnology **Theme:** Music Performance

EXPERIENCE

RSSI 9/98—Present
Laboratory Technician/Programmer
- Program computer applications for laboratory analysis tasks including data acquisition, data management, and report generation for laboratory samples
- Perform other technical support and laboratory tasks including PC support and maintenance, radon analysis, and preparation of survey instruments for calibration

Department of Molecular Pharmacology and Biological Chemistry, Northwestern University Medical School (Chicago, IL) 6/97—9/98
Research Technician
- Designed and programmed a high throughput drug screening assay for the Beckman Biomek robotic workstation
- Programmed Visual Basic routines in Excel to automate data import, calculation, and graphing
- Designed and optimized a system for cloning, expression, and purification of target proteins using an *E. Coli* expression system
- Performed assays with nucleic acid radiolabeling, protein dyeing, cell staining, and other techniques

Technology Support Services, Northwestern University (Evanston, IL) 9/95—6/97
Senior Residential Networking Consultant
- Performed advanced troubleshooting of Ethernet networking for student computer users in University residence halls
- Managed and trained a group of Residential Networking Consultants
- Managed ResCon recruitment, application, interview, and selection process

UOP Incorporated (Des Plaines, IL) 6/96—9/96
Chemical Engineering Intern—Yield Estimate Team
- Worked on project to test validity of a computer simulation for estimating produc yields of Fluid Catalytic Cracking (FCC) reactors
- Developed Access databases to archive simulated data, commercial reactor data, pilot plant data, and previous yield estimate calculations for comparison and calculation
- Designed "front-end" data-management applications using Visual Basic

SKILLS

Laboratory: Fluorescence, radiolabeling, PCR, cloning, bacterial cell culture, gel electrophoresis
Operating Systems: MS-DOS, Windows 3.x/95/98, NT 4.0, MacOS, UNIX
Applications: MS Access, Word, Excel, PowerPoint, Publisher
Programming Languages: Visual Basic, FORTRAN, HTML

BRYAN J. BAGG

CURRICULUM VITAE

Experience:

1989- RSSI, Morton Grove, Illinois. Health Physicist and Industrial Hygienist.

1985-1989 IIT Research Institute. Assistant Biologist

Health Physics:

Radiation Safety Officer at a large Research Institute and a private not-for-profit University. Assist the Radiation Safety Officer at two other programs. Oversee the use of radioactive materials for approximately 50 users authorized by the above listed Radiation Safety Programs. Have conducted numerous contamination surveys for naturally occurring radioactive material and various by-product materials. Directed the decontamination of approximately 50 microcuries of Sr-90 in a research laboratory. Experience in the operation and calibration of radiation survey meters. Developed computer simulation models for alpha-track radon monitor analyses.

Safety:

Performed over 100 Occupational Safety and Health Surveys which have included automobile repair facilities, office buildings and industrial complexes. Safety audits have comprised reviewing and recommending improvements for walking/working surfaces, machine guarding, housekeeping, ladder inspections, compressed gas cylinders, eyewash and safety showers, fall protection, electrical safety, lockout/tagout procedures, training programs and documentation. Participated in over 20 fire protection surveys.

Industrial Hygiene:

Performed over 200 Indoor Air Quality surveys which included quantitation of indoor air pollutants, assessing the adequacy of HVAC systems, interviewing employees regarding IAQ problems and recommending corrective actions.

Industrial Hygiene Audits have comprised reviewing and recommending improvements for respiratory protection programs and hazard communication programs. Have conducted air monitoring for asbestos and lead.

Environmental:

Performed over 100 Environmental Hazard Assessments which included one or more of the following: air monitoring for asbestos, collection of bulk samples for asbestos identification, collection of soil samples for analysis, conducting walk-through inspections to identify current and potential environmental hazards such as leaking underground storage tanks, reviewing records of past property ownership and recommending corrections actions.

Education:

1985-present Illinois Institute of Technology,
Graduate studies in Environmental Toxicology.

May 1985 Bachelor of Science, Biology, University of Illinois at Urbana/Champaign.

MICHAEL C. BUTLER

RSSI

6312 West Oakton Street
Morton Grove, IL 60053-2723
847-965-1999
Fax 847-965-1991

EDUCATION

Northwestern University — Evanston, IL

Bachelor of Science in Environmental Engineering, June 1999

- Concentration in History
- Relevant Coursework: Environmental Geology, Environmental Engineering Analysis, Ecosystems and Ecotoxicology, Radiological Health Engineering, Chemistry of the Natural Environment, Chemistry of the Aquatic Environment, Community Air Pollution, Public Health Engineering, Sanitary Engineering, Environmental Engineering Design, Environmental Impact Evaluation
- Honors and Activities: 1998-99 Environmental Engineering Service Learning Project, Special Olympics Advertising Committee Co-chair, Northwestern Intramural Basketball 1997 and 1998 Champions, Residence Hall Government Special Event Planning 1996-7, 1997-98 Fitness and Recreation Employee of the Year

SKILLS

Operating Systems: Windows, DOS, and UNIX
Languages: FORTRAN, Basic, MATLAB, and HTML
Programs: AutoCAD, and Microsoft Office Suite
Additional: Conversant in French. Strong communication and teamwork skills.

RELATED EXPERIENCE

Lake Calumet Cluster Site, 1998-99 Service Learning Project — Northwestern University

Student Researcher — (11/98 – 6/99)

- Research history and site characteristics of several hazardous waste storage and disposal facilities
- Determine contaminant concentrations and migration patterns
- Design a wetland to be used to effectively remediate contaminated soil

Radiation Safety Services, Inc. — Morton Grove, IL

Consultant / Laboratory Technician — (5/97 - present)

- Manage the completion of client projects involving identification, control, and remediation of radioactive materials and associated contamination in accordance with applicable regulations
- Produce and analyze radon monitoring devices
- Perform extensive laboratory work in radiation detection

McHenry Analytical Water Laboratory — McHenry , IL

Laboratory Technician — (9/94 - 9/95)

- Analyzed water samples for various chemical and biological characteristics
- Gained experience in groundwater monitoring and field sampling techniques
- Learned and performed most aspects of laboratory operation

Illinois Rivers and Middle School Groundwater Project — Woodstock, IL

Volunteer — (1994 - 1995)

- Organized and conducted regional activities within a statewide program to monitor water quality and educate elementary through high school students
- Gained experience working with and presenting to large and diverse groups

OTHER EXPERIENCE

Henry Crown Sports Pavilion and Norris Aquatic Center — Northwestern University

Building Supervisor — (9/95 - present)

- Directly oversee constant operations of a large sports and recreation facility
- Responsible for handling ongoing procedures and any emergency situations

AREAS OF SPECIALIZATION

- *Industrial Hygiene*
- *Risk Assessment*

EDUCATION

B.S. Biology, Loyola University of Chicago

Asbestos Project Management, 40-Hr. Certification, University of Illinois

Respiratory Protection-OSHA Training Institute, Des Plaines, Illinois

Continuing Program of Short Courses. Past courses include: Industrial Hygiene Toxicology, Ventilation Design, Noise Control, Training, Hazard Communication, Phase I Environmental Site Assessments, The SUPERFUND Process, EPA-Principles of Risk Assessment, Air Sampling-Hazardous Waste Sites, Integrated Emergency Response Planning, Air Quality, DOT-Shipping Hazardous Materials, Determining Action Levels for Hazardous Waste Sites.

Representative Experience

Serves as the Manager of Industrial Hygiene and Corporate Health and Safety Officer for STS Consultants. Responsibilities include conducting in house training in compliance with the Occupational Safety and Health Administration's Hazardous Waste Operations and Emergency Response Standard and providing technical assistance on industrial health and chemical safety for all levels of staff and management in 6 regional offices.

Duties also included development and oversight of the medical surveillance of the Environmental Sciences Group Staff.

Accountabilities included the development of comprehensive Site Safety Plans for SUPERFUND project work. Some of the contaminants in soils and groundwater which required air monitoring of personnel have included: VOCs, heavy metals, asbestos, mercury, vinyl chloride, mercury, chlorinated organics, PNAs, PCBs and BTEX constituents.

Extensive experience in design, implementation, auditing, and review of site specific safety plans.

A representative sampling of occupational and environmental health studies conducted for industrial, academic, government and commercial clients includes:

- Development of an air sampling strategy and a medical surveillance program for a paper company. Chemical and biological airborne exposures in the sludge landfill work environment were considered and monitored to define the objectives of the medical surveillance program and worker protection. Worker exposure levels were compared to Permissible Exposure Levels (PELs) from the U.S. Department of Labor, Occupational Safety and Health Administration and the American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Values (TLVs).
- Exposure determination to respirable silica dust during mixing, compounding and packaging of refractory material containing cristobalite, tridymite and quartz.

REGISTRATION

Licensed Industrial Hygienist: Illinois

American Board of Industrial Hygiene

Certified for Comprehensive Practice in Industrial Hygiene (Certification Number: 2929)

Certified Hazardous Materials Manager - 1996

Certified by Illinois Department of Nuclear Safety for Radon Measurement

Occupational Hearing Conservationist

AFFILIATIONS

Current Chair of AIHA/ACGIH Hazardous Waste Committee

American Industrial Hygiene Association (AIHA)

American Conference of Governmental Industrial Hygienists

American Society of Safety Engineers

Air & Waste Management Association

National Safety Council

- Initiation and development of audit parameters for health and safety and environmental functions of a major computer company. Also coordination of national and international site visits, reviewing air monitoring records, medical surveillance programs and data, MSDS records, hazard communication programs, respiratory protection programs, emergency preparedness, and confined space entry procedures.
- Industrial hygiene consultation and air sampling for a magazine and book printer where benzene was found as an impurity in a commonly used film cleaning solvent. Airborne levels were above the recommended occupational health exposure standard. Medical surveillance guidelines were developed and immediate product substitution sought.
- Direction of indoor air qualities studies for grade schools, churches, real estate development offices, new construction, and commercial and industrial real estate. ASHRAE ventilation guideline deficiencies were found and excessive carbon dioxide levels determined in many cases.
- Coordination and assistance in preparation of company policies, safe work practices and on-going air sampling programs where known teratogens, mutagens or carcinogens were present in the workplace.
- Air sampling of personnel receiving and packaging animal specimens preserved in formaldehyde. Ventilation design assistance also provided.
- Development of site specific hazard communication training programs for electroplating plants, metalgood manufacturers, furniture/wood product plants, chemical and paint facilities.
- Assessment of extensive industrial hygiene situations involving all types of occupational health hazards both chemical and physical for a wide variety of industries.
- Coordination of hearing conservation programs and development of engineering controls to reduce structure born noise. Octave band analyses of noise spectra and design of acoustic enclosures for a major book and magazine publisher.

- Interpretation of the technical aspects of workplace exposures that have resulted in workers compensation occupational disease claims.
- Completion of environmental risk assessment studies for a variety of businesses, examples of which include: solvent reclaimers, treatment, storage and disposal facilities, hazardous waste landfills, small appliance manufacturers, foundries, community development centers and automotive manufacturing facilities. Methodology for known soil, groundwater, and surface impoundment contamination was developed for radioactive waste, benzidene based dyes, coal tar pitch volatiles, pentachlorophenol, creosote, and PNAs.
- Involvement in review and formulation of computerized tracking of material safety data sheet information for plant incoming raw materials.
- Health assessment on cyanide soil contamination of a site under development as a shopping/ community center.
- Administration of the industrial health/hygiene training for safety professionals involved in loss prevention functions.
- Participation in corporate committees on environmental conservation, hazardous materials, safety and loss prevention, risk assessment guidance (TACO, RAGS).
- Evaluation of potential indoor air quality concerns at a site where a new company day care facility was to be erected. Indoor radon concerns and the potential for children contacting contaminated soils were addressed by collecting samples from the footprint of the proposed building. Determination of Radium 226, RCRA metals, cyanide, pesticides, VOCs and semi-volatile VOCs concentrations were made on soil samples. The health and environmental criteria for soil constituents used were derived from EPA established chronic (and in some cases, acute) toxicity criteria for ingestion (soil and drinking water) and inhalation exposure routes. The cleanup criteria for soils addressed the increased concern for the ingestion route of surficial soil that is likely by children and also the increased risk to children of inhalation of radon. Concentrations of Radium 226 and cyanide were found in the topsoil and at varying depths. The health concerns were addressed with the client so that remediation efforts could be determined.

- Annual indoor air quality monitoring and field screening at a multi-story office built on a landfill for combustible gases, percent oxygen, hydrogen sulfide, carbon dioxide and volatile organic vapors. The purpose of the indoor air monitoring program was to evaluate the concentrations of combustible or toxic vapors that may migrate from the underlying inactive landfill.

- Complaints of indoor air quality concerns by teachers and office staff led to an evaluation of the ventilation and carbon dioxide levels in a school building. A questionnaire and interview processes was concurrently conducted along with development of an air sampling program. The malfunctioning of a make-up air unit, recent redesign and partitioning of classrooms (without consideration of ventilation needs), the sealing of windows (that previously opened) resulted in appreciably elevated carbon dioxide levels in the school by lunch time.

- Complaints of dizziness by Activity Center staff at a landmark house of worship prompted an IAQ evaluation including review of the air handling and cooling systems, identifying possible air contaminant sources (MSDS review) that could have been associated with the exterior restoration that was occurring during the time of the complaints, distributing a questionnaire to determine possible correlation of complaints of Activity Center staff, evaluating environmental air quality by measuring carbon dioxide levels, VOCs, temperature and humidity. The evaluation found that there were several compounding factors which were related to the reported illnesses; a malfunctioning air handling unit damper and a boiler cleaning activity which entrained dust in the air conditioning supply diffusers.

- Evaluation of a major department store's Indoor Air Quality by conducting an evaluation for Total Suspended Particulate, VOC determination, humidity, carbon dioxide and temperature. The indoor air quality was compared to outdoor air concentrations of the same contaminant parameters. Low humidity levels were determined to be the cause of the mucous membrane (eye and nose) irritations and the complaints by contact lens wearers.

- The construction of a restaurant was stalled due to the local fire department's concerns over correct ventilation and removal of grease laden vapors per NFPA standards. An indoor air quality study was conducted at an existing similar restaurant of the chain which had cooking at booths and tables. Ambient total suspended particulate concentrations were determined as well as the influence of the cooking source and environmental tobacco smoke (ETS) in smoking areas of the restaurant.
- A baseline environmental air quality study was conducted as part of a property transaction and Phase I evaluation of 5 office buildings with varying tenant occupancies. A protocol was developed to assess the likely indicators of acceptable Indoor Air Quality per the proposed OSHA standard and ANSI guidance.